IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Panorama of the view south from Keys View in the Little San Bernardino Mountains, Joshua Tree National Park, California, United States. Visible landmarks are the Salton Sea (230ft below sea level) at rear left, along towards the center the Santa Rosa Mountains behind Indio and the San Jacinto Mountains behind Palm Springs. In the valley floor, the San Andreas Fault is clearly visible. At the rear right is the 11,500 ft (3,500 m) San Gorgonio Mountain Source: https://en.wikipedia.org/wiki/Coachella_Valley

September 27, 2014
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

September 24, 2018

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ACRONYM DESCRIPTIONS

AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HF	Historical Fluctuations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NAM	North American Monsoon
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service
PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns

$PM_{2.5}$	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan

I Introduction

On September 27, 2014, the State and Local Ambient Air Monitoring Station (SLAMS) located in Brawley (AQS Site Code 06-025-0007), California measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitors Model 1020 (BAM 1020) measured a (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentration of 219 µg/m^3. PM_{10} 24-hr measurements measured above the 150 µg/m^3 are exceedances of the NAAQS. The SLAMS in Brawley was the only station in Imperial County to measure an exceedance of the PM_{10} NAAQS on September 27, 2014.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON SEPTEMBER 27, 2014

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
9/27/2014	**Brawley**	**06-025-0007**	**3**	**21**	**219**	**150**
9/27/2014	Niland	06-025-4004	3	**17**	*174	150

All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]
September 27, 2014 was not scheduled sampling day: For Niland on September 27, 2014 the concentration of 174 is not a 24-hour average thus not an exceedance. Regulatory requirements provide for a minimum of a 75% capture rate[2]

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size-Selective Instrument (SSI) since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On September 27, 2014 the Brawley monitor was impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds associated with an impressive upper level low and accompanying cold front that moved through southern California, including Imperial County.[3]

This report demonstrates that a naturally occurring event caused an exceedance observed on

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2014, Pacific Daylight Time (PDT) is March 9 through November 2. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

[2] On September 27, 2014, the Niland monitor failed to meet critical criteria requirements causing the invalidation of 7 hours of measured concentrations. The Niland monitor failed to meet the required USEPA capture rate of 75% for September 27, 2014 making the 17-hour average of 174 µg/m^3 not an exceedance.

[3] Area Forecast Discussion National Weather Service San Diego CA 257 AM PST (357 AM PDT); 910 AM PST (1010 AM PDT); 806 PM PST (906 PM PDT) and Phoenix AZ 130 AM PST (230 AM MST); 351 AM PST (451 AM MST); 810 AM PST (910 AM MST); 750 PM PST (850 PM MST), September 27, 2014

September 27, 2014**,** which elevated particulate matter and affected air quality. The report provides concentration-to-concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedance would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM_{10} 24-hour NAAQS exceedances of 219 µg/m^3 (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[4].

I.1 Demonstration Contents

Section II - Describes the September 27, 2014 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III – Using time-series graphs, summaries and historical concentration comparisons of the Brawley station this section discusses and establishes how the September 27, 2014 event affected air quality demonstrating that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the September 27, 2014 event and its resulting emissions defining the event as a "natural event".[5]

Section IV - Provides evidence that the event of September 27, 2014 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

[4] "Treatment of Data Influenced by Exceptional Events; Final Guidance", 81 FR 68216, October 2, 2016

[5] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD and the National Weather Service (NWS) provided notification via the ICAPCD's webpage that winds 15 to 25 miles per hour (mph) could affect this region potentially elevating particulate matter. The NWS Phoenix office issued several notices between September 26, 2014 and September 27, 2014 advising of thunderstorm activity on September 26, 2014 and gusty westerly winds on September 27, 2014. The notices included Urgent Weather Messages, Hazardous Weather Outlooks, and Special Weather Statements containing, wind advisories and a Blowing Dust Advisory for Imperial and Yuma Counties. Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day in Imperial County. The ICAPCD issued an Air Quality Alert for Niland at 08:00 on September 27. **Appendix A** contains copies of notices pertinent to the September 27, 2014 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured concentrations in Brawley. The request, dated May 28, 2015 requested an initial flag for the measurement from the BAM 1020 in Brawley of 219 $\mu g/m^3$. Subsequently, after submittal of the request, CARB received corrected FEM data measurements in standard conditions, originally submitted in local conditions. USEPA requires data in standard conditions when making regulatory decisions. **Table 1-1** above provides the PM_{10} measured concentrations for all monitors in Imperial County for June 26, 2014. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The

submitted request included a brief description of the meteorological conditions for September 27, 2014 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on March 12, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentration of 219 $\mu g/m^3$ which occurred on September 27, 2014 in Brawley. The final closing date for comments was April 11, 2018 **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the September 27, 2014 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on September 27, 2014, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

a The event created the meteorological conditions that entrained emissions and caused the exceedance.
b The event clearly "affects air quality" such that there is the existence of a clear causal relationship between the event and the exceedance.
c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
d The event "is not reasonably controllable and not reasonably preventable."
e The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."

f The event is a “natural event” where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentration in Brawley.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II September 27, 2014 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the September 27, 2014 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**.The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on September 27, 2014, occurred at the Brawley station. The Brawley, Niland and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on September 27, 2014, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Table 2-1)**.

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

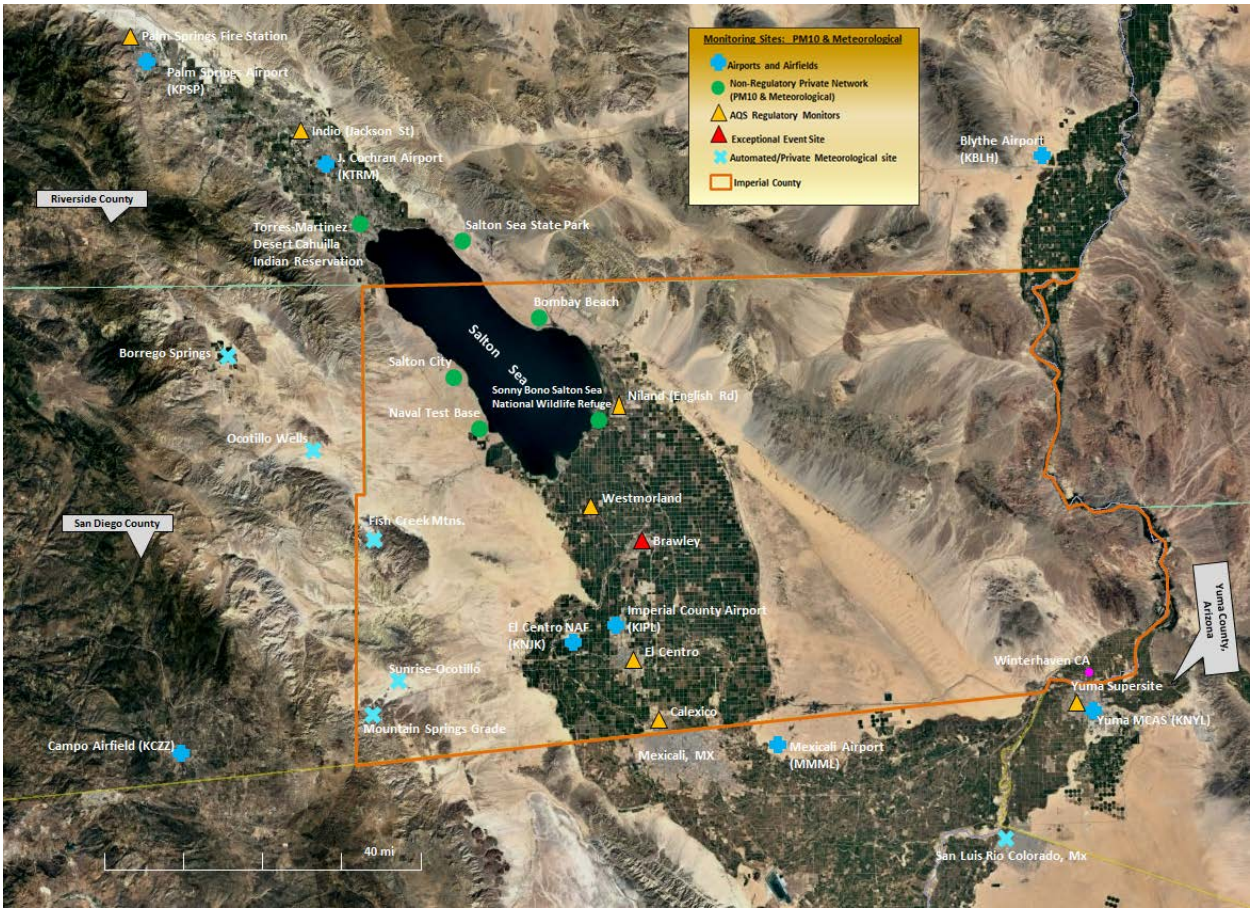


Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west

of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

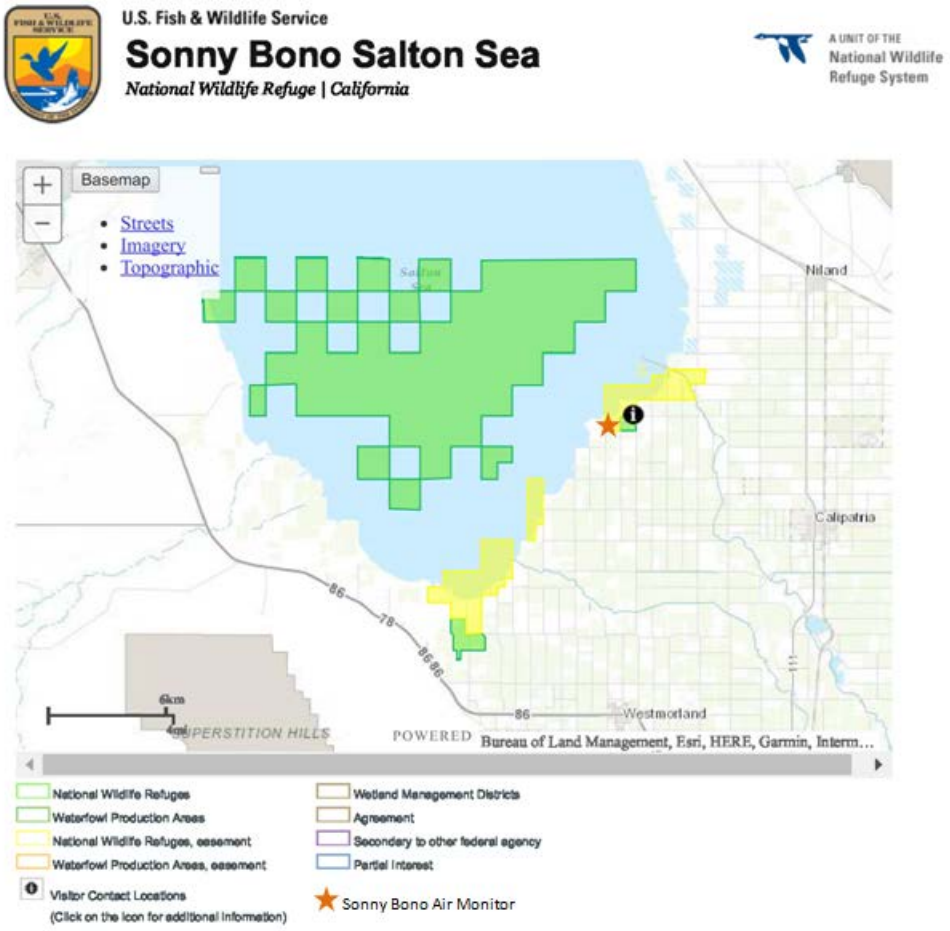


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
SEPTEMBER 27, 2014

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} (ug/m^3) Avg***	1-hr PM_{10} (ug/m^3) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					219.7	617.6	200		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	-	-	-	15.8	1800
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	-	-	-	12.7	1600
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-57	-	-	-	18.6	700
		BAM 1020					175.4	504	200		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	-	-	-	-	-
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	32.5	111	0000	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	106.5	297	200	-	-
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	176.4	770	600	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

*Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

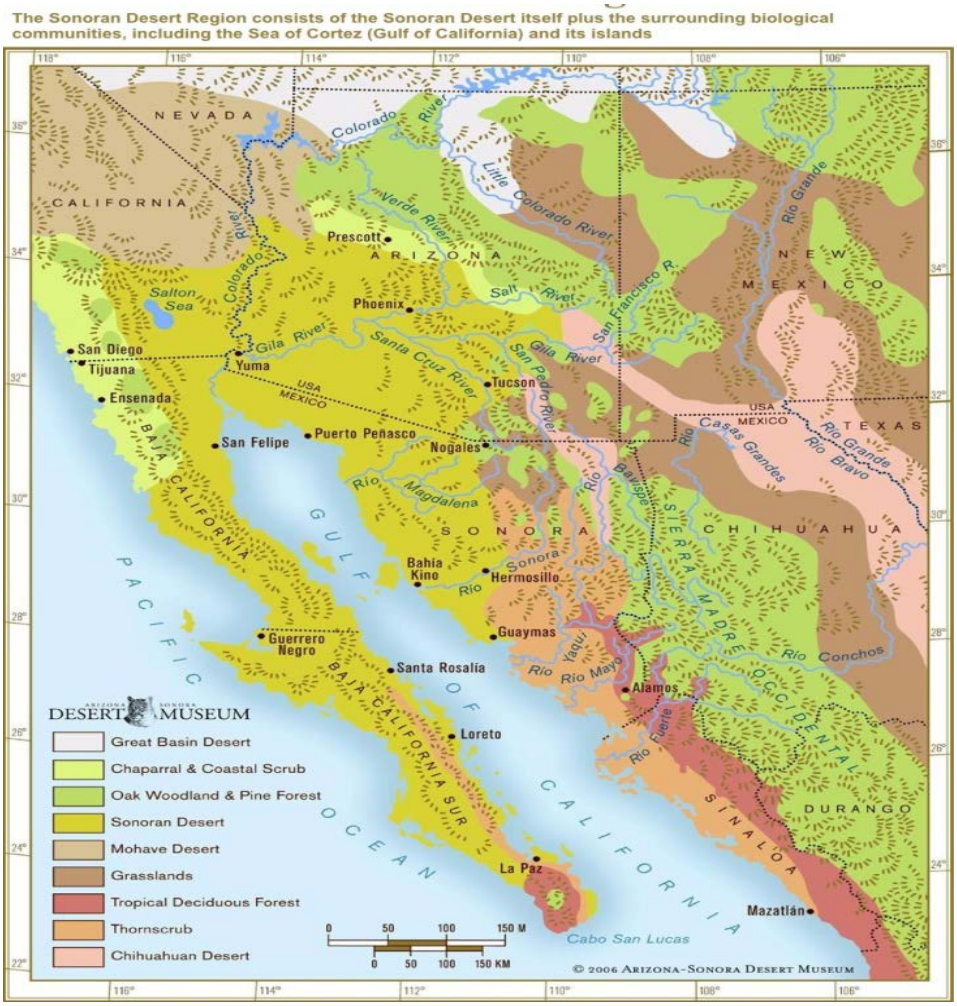


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 3.11" (**Figure 2-16)**. During the 12-month period prior to September 27, 2014, Imperial County measured total annual precipitation of 2.57 inches. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

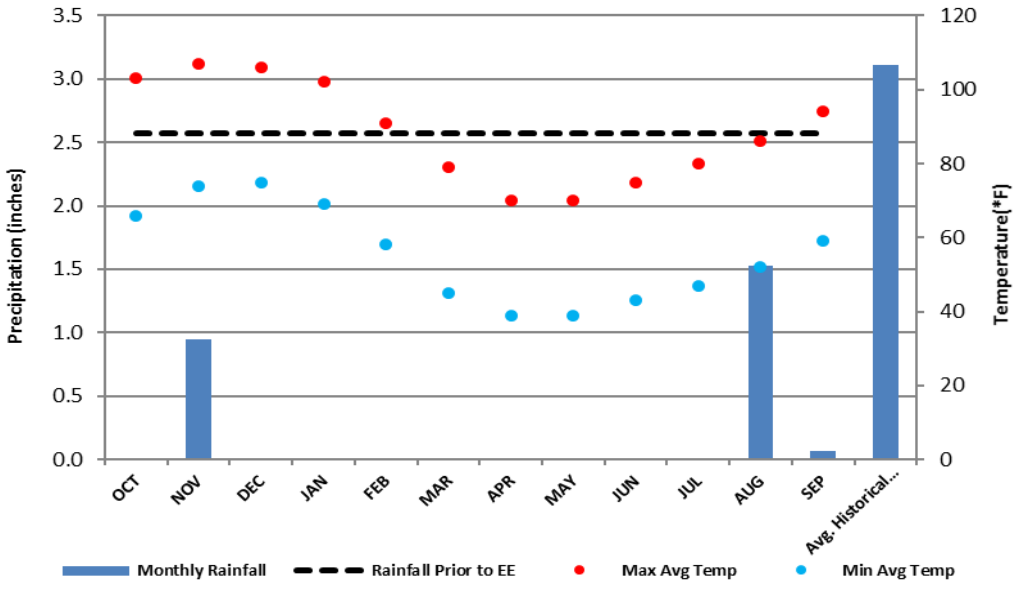


Fig 2-16: In the months prior to September 27, 2014, the region suffered abnormally low total precipitation of 2.57 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Weather Underground, California Observed Climate Normals, and Western Regional Climate Center (WRCC) http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[6] Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds suspend dust into the atmosphere and transport windblown dust over long distances, especially if soils in the region are dry. The wind event of September 27, 2014 occurred when a strong Pacific low-pressure system followed the remnants of thunderstorm activity in the region.

II.3 Event Day Summary

The exceptional event for September 27, 2014 occurred when a strong Pacific low moved over the region following residual monsoonal air moving northward out of Mexico. The result brought strong and gusty westerly winds across the mountains and deserts of southeastern California and portions of southwestern Arizona after strong thunderstorms erupted in the unstable airmass over Imperial County.[7]

As a result, the National Weather Service (NWS) offices in San Diego and Phoenix issued no less than 20 notices in the form of Urgent Weather Messages, Preliminary Storm Reports, Severe Weather Statements, Hazardous Weather Outlooks and Special Weather Statements, identifying thunderstorm activity in Imperial and Yuma Counties on September 26, 2014 and gusty westerly winds from the San Diego Mountains and desert eastward into southwestern Arizona on September 27, 2014. Strong westerly winds up to 38 mph with gusts up to 43 mph occurred in Imperial County.

[6] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html
[7] Area Forecast Discussion National Weather Service San Diego, CA 830 PM PST (930 PM PDT), Friday, September 26, 2014

Figures 2-17 through 2-21 provide information regarding the expected movement of the low pressure, clouds and cold front through southern California for September 27, 2014.

FIGURE 2-17
FORECAST CHARTS SEPTEMBER 27, 2014

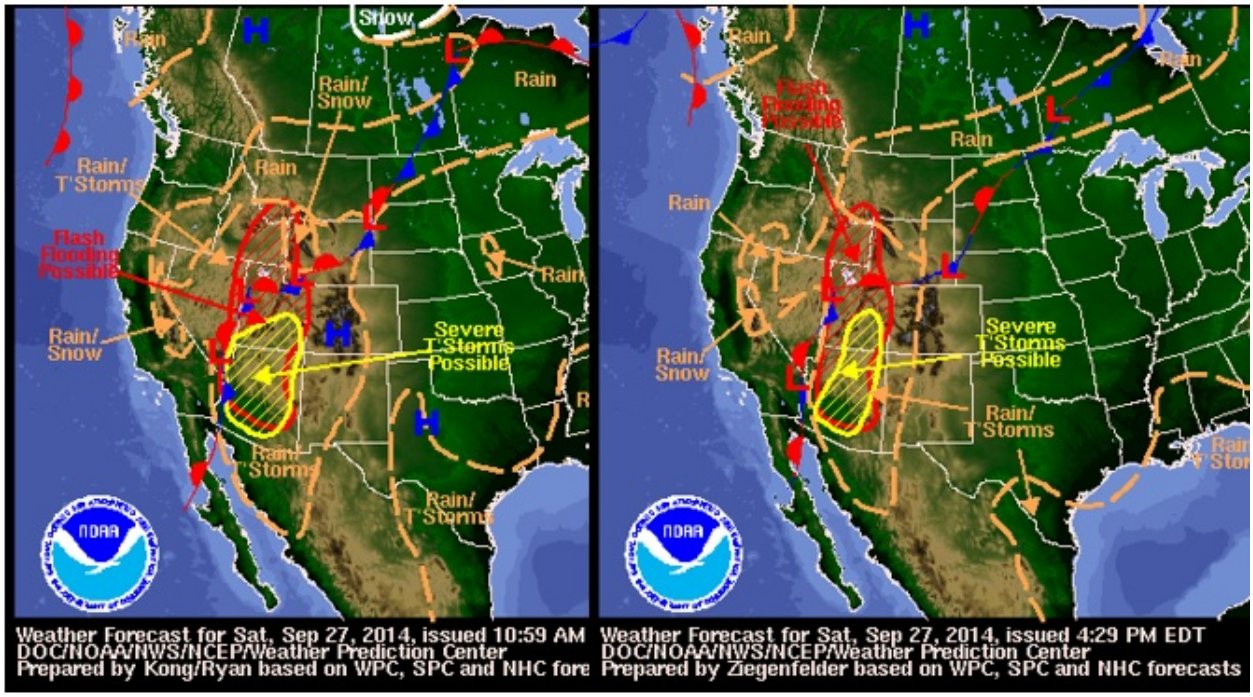


Fig 2-17: Morning and afternoon forecast charts (0659 PST and 1229 PST) on September 27, 2014 show a frontal system on the eastern edge of the Imperial County. Severe thunderstorm activity was forecast for nearby regions. This was part of a trough of low pressure that moved inland over central California, bringing gusty winds as a result of the strengthening onshore flow. Images are courtesy of the National Weather Service Weather Prediction Center

FIGURE 2-18
CLOUDS ASSOCIATED WITH THE INTRUSION OF MONSOONAL AIR

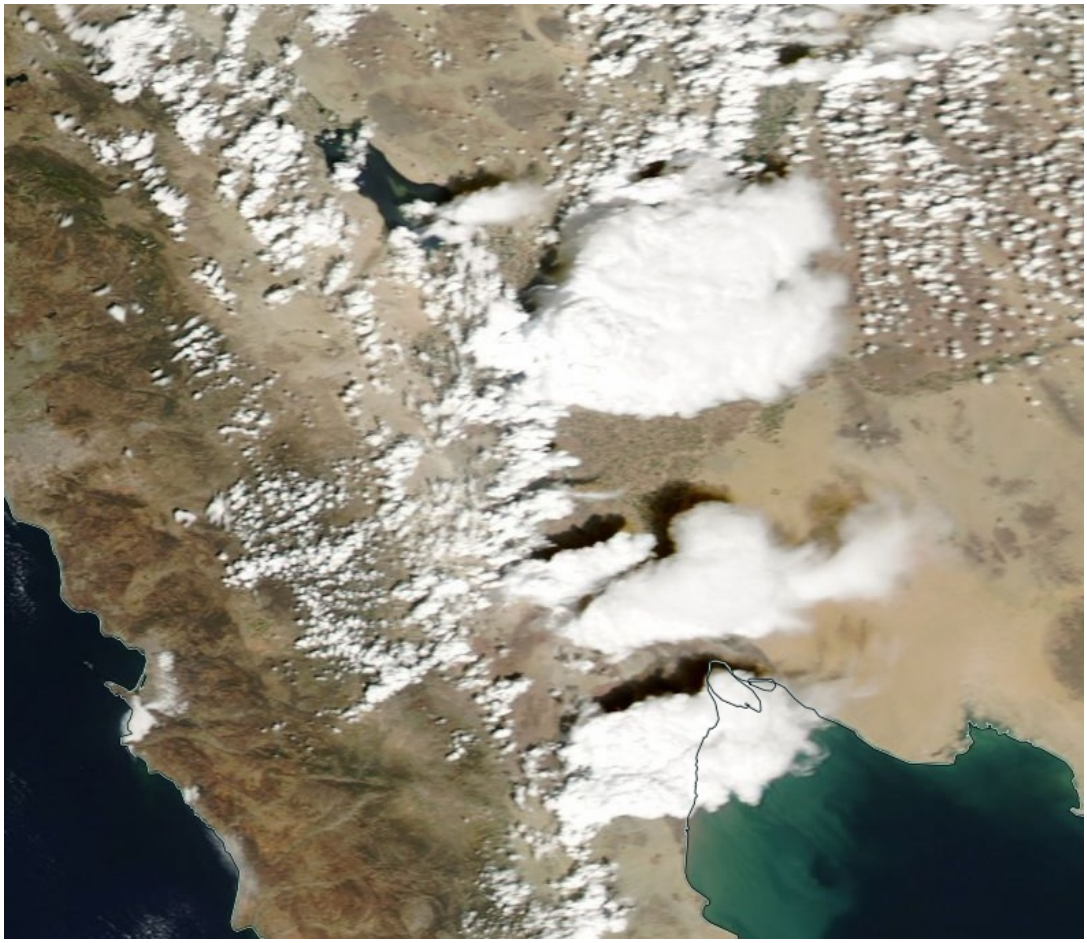


Fig 2-18: Monsoonal air remained over the region through the late afternoon of September 26, 2014. The intrusion of monsoonal air provided the ideal conditions for thunderstorm activity over central Imperial and Yuma counties on September 26, 2014. Although not depicted here, as the upper level low moved inland on September 27, 2014 gusty westerly winds followed the diminished thunderstorm activity from the prior day. Area forecast discussions and several notices issued by NWS explain how the gusty westerly winds blew over and through the San Diego mountains and passes and into Imperial County on September 27, 2014. This image was captured by the MODIS instrument[8] onboard the Aqua satellite at ~1330 PST. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

[8] MODIS (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 1:30pm (Appendix A).

FIGURE 2-19
UPPER LOW-PRESSURE SYSTEM MOVES IN SEPTEMBER 27, 2014

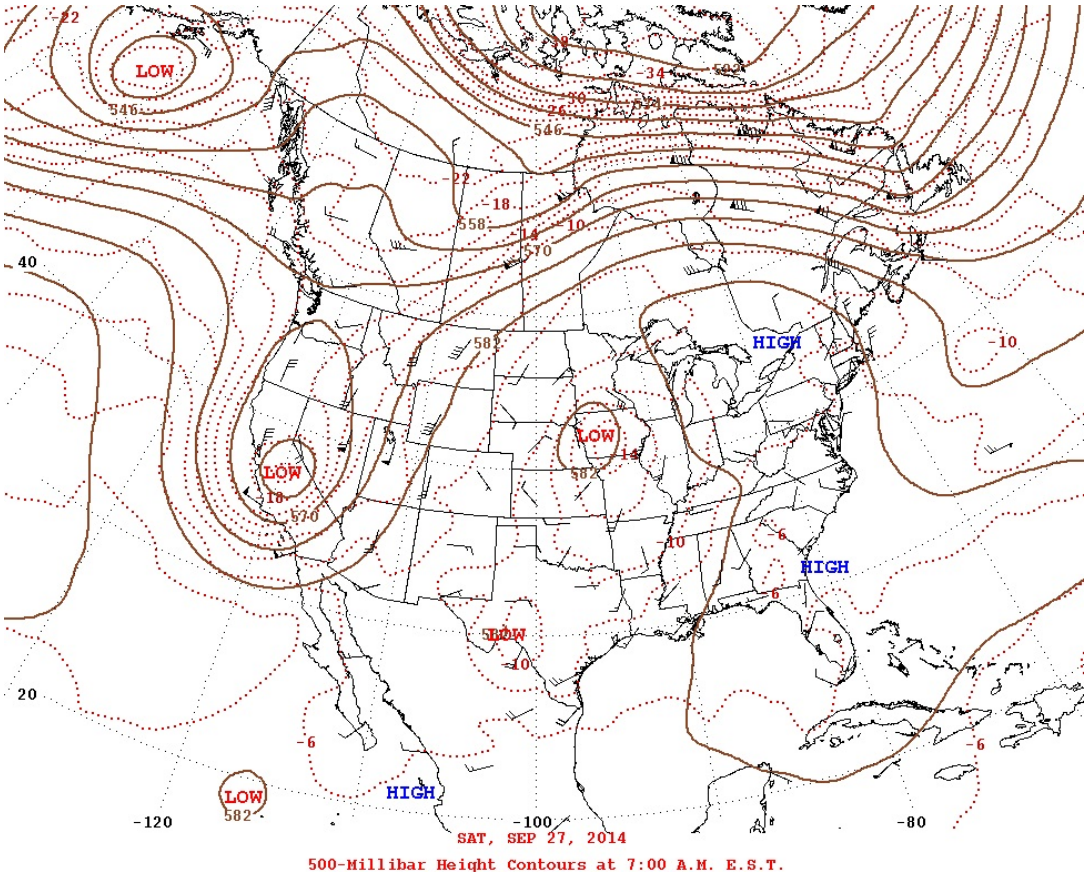


Fig 2-19: A 500-mb map (left) issued by the Weather Prediction Center at 0400 PST on September 27, 2014. The 500mb map shows the upper low pressure system over central California. Courtesy of National Centers for Environmental Prediction, Weather Prediction Center;
http://www.wpc.ncep.noaa.gov/dailywxmap/dwm_500ht_20140927.html

FIGURE 2-20
SURFACE LOW AND COLD FRONT MOVE THROUGH SE CALIFORNIA

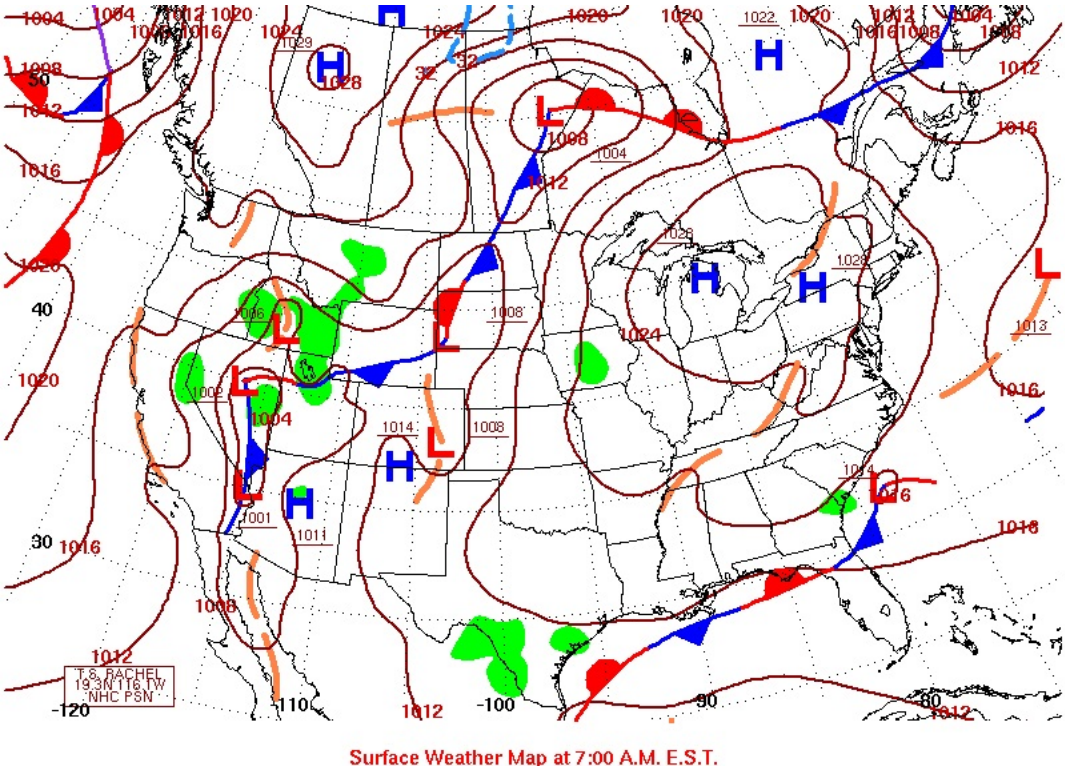


Fig 2-20: A surface map (0400 PST) shows the surface low associated with the upper level low, and the frontal system that passed through California. Although not shown, the system strengthened the onshore flow causing gusty westerly winds over the San Diego Mountains and into the deserts. Courtesy of National Centers for Environmental Prediction, Weather Prediction Center

FIGURE 2-21
WESTERLY WINDS INCREASE ACROSS SE CALIFORNIA

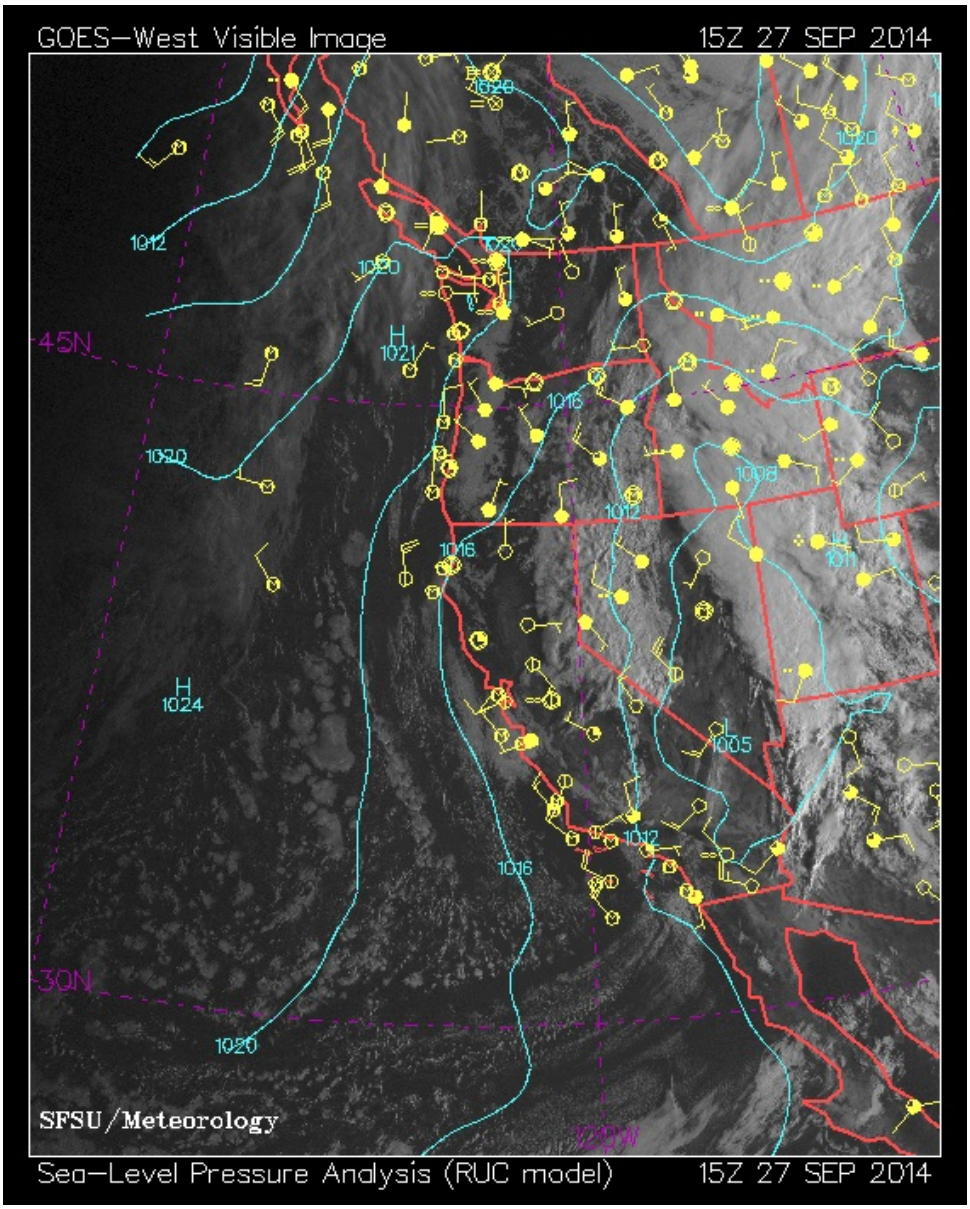


Fig 2-21: A visible sea level pressure analysis satellite composite image captured by a GOES-W satellite at 0700 PST on September 27, 2014. Wind barbs depict WNW winds of ~28 mph across southeast California. Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

As mentioned above, the NWS offices in San Diego and Phoenix issued no less than 20 different notices as early as September 25, 2014 through September 27, 2014. According to the information provided by the Area Forecast Discussions, Special Weather Statements, Bulletins and Severe Weather Statements moisture that moved into California and Arizona from Mexico brought an unstable air mass ideal for the development of thunderstorms in central Imperial County on September 6, 2014. Some of the notices, found in **Appendix A**, identify strong thunderstorms 17 miles northeast of Brawley to 8 miles north of Holtville to Calexico moving north at 25 mph on September 26, 2014.[9] By the early afternoon hours, thunderstorm activity begins to decrease in intensity as the airmass continues moving north.[10]

By mid-morning on Saturday, September 27, 2014 the impressive upper level low was centered over the San Joaquin Valley while the associated line of thunderstorms pushed east into Utah and Arizona.[11] During the evening hours of September 26, 2014, winds shifted westerly as the low pressure continued moving inland. On September 27, 2014, winds picked up early in the morning and remained strong for most of the day. Imperial County Airport (KIPL) had two hours of winds at or above the 25-mph threshold, while the El Centro NAF (KNJK) had 12 hours of winds at or above the 25-mph wind threshold with a peak gust of 43 mph. Winds diminish during the late evening hours of September 27, 2014. **Figure 2-22** depicts some of the key elements that led to the exceedance on September 27, 2014.

[9] Special Weather Statement National Weather Service Phoenix AZ 115 PM PST (215 PM MST), Friday, September 26, 2014
[10] Sever Weather Statement National Weather Service Phoenix AZ 309 PM PST (409 PM MST), Friday, September 26, 2014
[11] Area Forecast Discussion National Weather Service San Diego CA 910 AM PST (1010 AM PDT), Saturday, September 27, 2014

FIGURE 2-22
RAMP-UP ANALYSIS SEPTEMBER 27, 2014

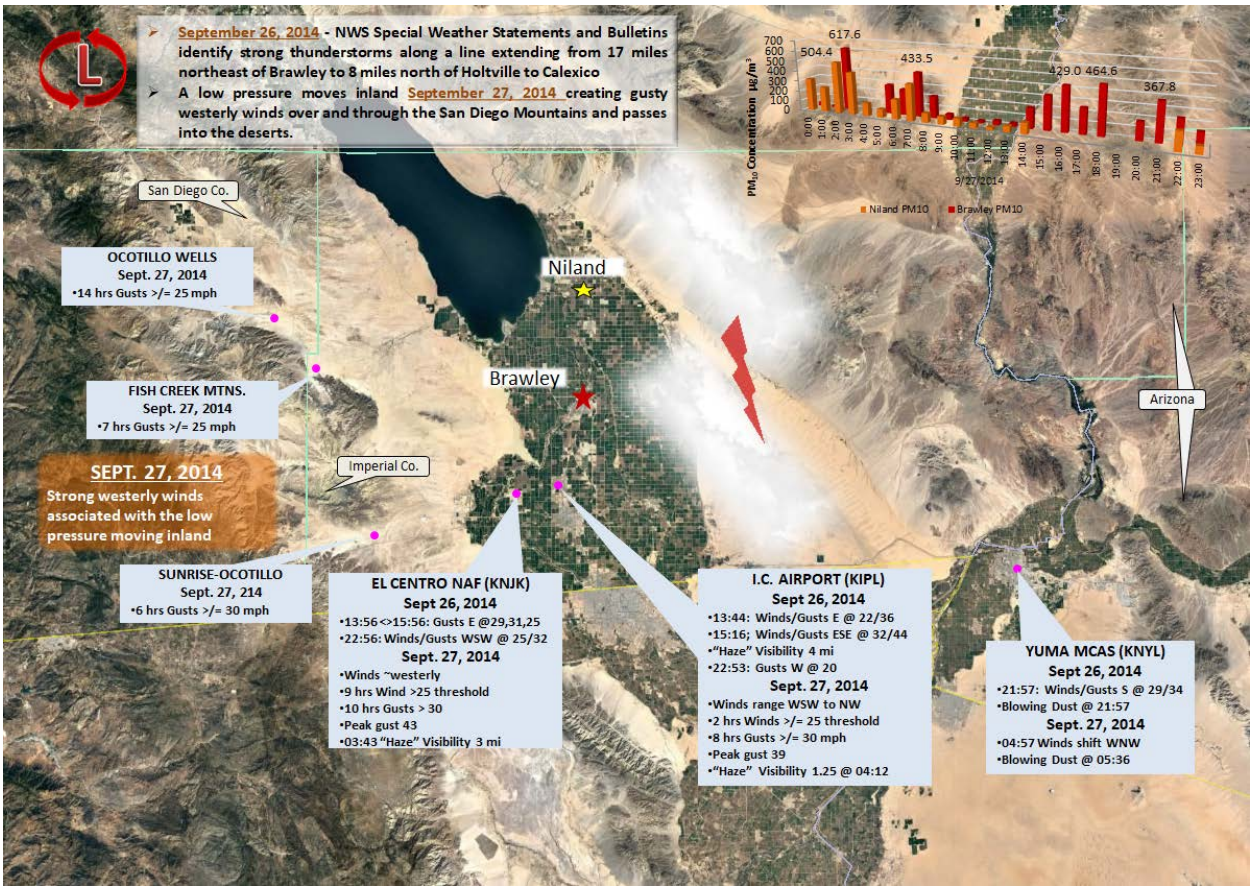


Fig 2-22: Key events in the ramp-up leading to the exceedance at the Brawley monitoring site. Gusty easterly winds from thunderstorm outflows on September 26 shifted to westerly on September 27, 2014 as a low-pressure system moved in. Winds became gusty going into September 27, 2014, and remained so for most of the day. Base map from Google Earth

Table 2-4 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON SEPTEMBER 27, 2014

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed	
						Brly	Nlnd
IMPERIAL COUNTY							
Imperial Airport (KIPL)	26	290	653	39	753	253	194
Naval Air Facility (KNJK)	31	280	756	43	556	433	357
Calexico (Ethel St)	15.8	291	1800	-	-	464	-
El Centro (9th Street)	12.7	263	1600	-	-	429	-
Niland (English Rd)	18.6	259	700	-	-	433	357
RIVERSIDE COUNTY							
Blythe Airport (KBLH)	18	260	1452	24	1552	195	106
Palm Springs Airport (KPSP)	21.9	320	053	35	053	36	315
Jacqueline Cochran Regional Airport (KTRM) - Thermal	19.6	330	252	26	252	617	504
ARIZONA - YUMA							
Yuma MCAS (KNYL)	16	310	536	26	536	248	32.0
MEXICALI - MEXICO							
Mexicali Int. Airport (MXL)	18.4	280	1840	-	-	464	-

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory models [12] **(Figures 2-23, 2-24 and 2-25**) illustrate the airflow in the hours leading up to and during the event. During the afternoon of September 26, 2014, when strong winds, resulting from thunderstorm activity, as measured at KIPL and KNJK and as discussed above approached Brawley from the south as depicted in **Figure 2-23** while **Figure 2-24** illustrates airflow ending September 27, 2014 at 0200 PST (left) and at 1800 PST (Right).

All three trajectories illustrate the path of airflow for both days, particularly up to the 10 meter and 100-meter heights. The first impact is from across the arid soils of the Sonoran Desert (Laguna Salada) in northern Mexico while the second impact results from the wind shift from southerly to westerly. Both transported windblown dust from two different source areas into Imperial County. The September 26, 2014 airflow, as mentioned above originated from north eastern Mexico while on September 27, 2014 airflow came over the San Diego mountains and passes onto the desert floor over agricultural lands affecting both the Niland and Brawley monitors. While the Niland monitor measured elevated levels only the Brawley monitor

[12] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

exceeded the NAAQS. Because of a power failure at the Niland station, the Niland monitor did not measure 7 hours of concentrations. As such, it is unclear if the Niland monitor would have exceeded the NAAQS. It should be noted that modeled winds differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km and is integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

FIGURE 2-23
HYSPLIT BACK-TRAJECTORY MODEL SEPTEMBER 26, 2014

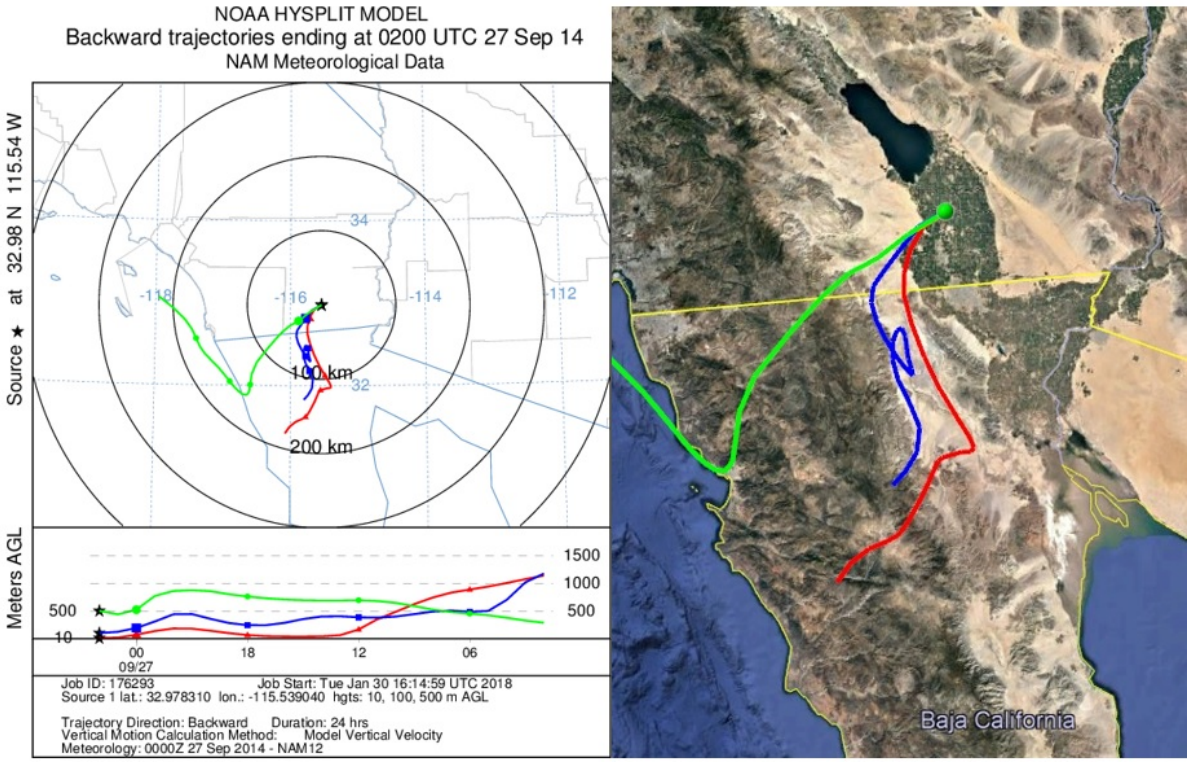


Fig 2-23: A 24-hour HYSPLIT back-trajectory model shows the path of airflow ending at Brawley on September 26, 2014 at 1800 PST. Airflow during this period was from the south as confirmed by notices issued by the NWS indicating the presence of an unstable airmass. The unstable airmass developed into thunderstorm activity just east of Brawley. The HYSPLIT helps to illustrate the path of the monsoonal moisture air mass not the thunderstorm activity. The thunderstorm activity that developed help loosen soils in Imperial County. Shortly after, the wind direction shifted westerly as the low pressure moved in. Red line represents airflow at 10-meters; blue = 100m; green = 500m. Yellow line represents the international border. Generated through the NOAA Air Resources Laboratory. Generated through the NOAA Air Resources Laboratory

FIGURE 2-24
HYSPLIT BACK-TRAJECTORY MODEL SEPTEMBER 27, 2014

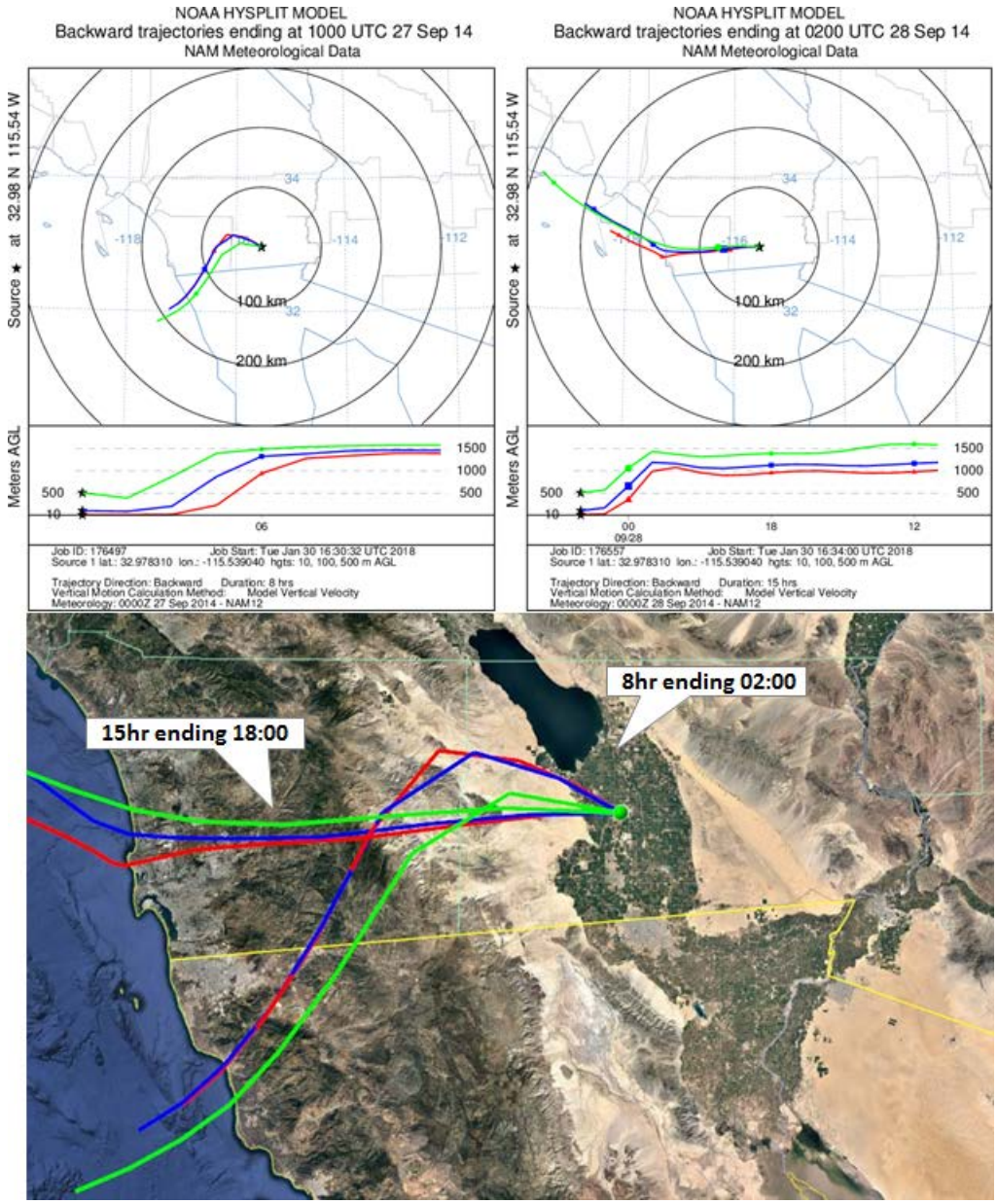


Fig 2-24: A pair of HYSPLIT back-trajectory models show the path of air flow ending at Brawley on September 27, 2014 at 0200 PST (left) coincident with the peak measured hourly concentration and at 1800 PST. The base map shows both trajectories. Red line represents air flow at 10-meters; blue = 100m; green = 500m. Yellow line represents the international border. Generated through the NOAA Air Resources Laboratory. Google Earth base map

Figure 2-25 illustrates the shift in wind direction during the event. Up through about 1800 PST on September 26, 2014, the airflow generally approached from a southerly direction (upper airflow was more SSW). The back-trajectory indicates airflow from the south, while individual

stations such as KIPL and KNJK show winds ranged from the east to south. While not depicted in the figure the unstable airmass caused the development of a line of thunderstorms within Imperial County and Arizona. The drifting thunderstorms allowed for soils to loosen and suspend into the atmosphere. By Saturday, September 27, 2014 as the upper level low moved further inland the shift in wind direction from southerly to westerly caused previously loosened soils to suspend and transport into Imperial County.

FIGURE 2-25
COMBINED HYSPLIT TRAJECTORIES

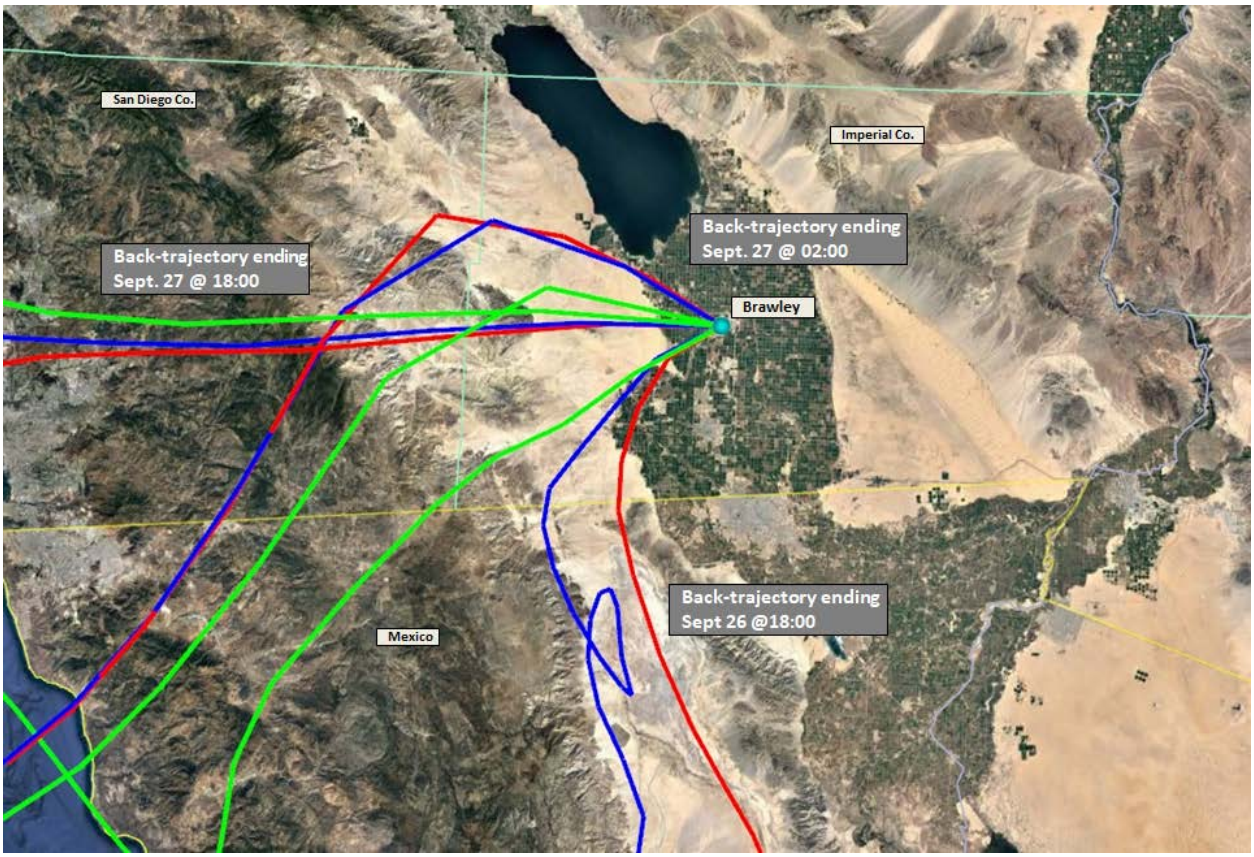


Fig 2-25: A trio of back-trajectories illustrates the shift of airflow by Saturday, September 27, 2014. A 24-hour back-trajectory ending at 1800 PST on September 26, 2014 reflects the southerly influence of the air parcel. The highest elevated concentrations on September 26, 2014 correspond with the hours indicated by the NWS in the notices. The 8-hour back-trajectory ending at 0200 PST generally runs from the period that winds shifted from southerly to westerly. On September 27, 2014 at 0200 PST, Brawley measured its highest concentration in the morning. Red lines indicate airflow at 10 meters AGL (above ground level); blue is 100m; green is 500m. Dynamically generated through NOAA's Air Resources Laboratory. Google Earth base map

Figures 2-26 and 2-27 illustrate the measured wind speeds and elevated levels of hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma counties September 26, 2014 through September 28, 2014. Elevated emissions transported into Imperial County affected the Brawley

and Niland monitors when thunderstorms on September 26, 2014, caused soils to loosen and suspend. As the thunderstorm activity diminished and moved east, by Saturday September 27, 2014 the passage of an impressive upper level low followed creating a shift in winds to a westerly direction. The Brawley monitor measured the highest elevated concentrations between 0200 PST and 2300 PST coincident with continual measured wind speeds and gusts above 20 mph, with more than one hour at or above 25 mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".[13] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the September 27, 2014 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

FIGURE 2-26
72 HOUR PM_{10} CONCENTRATIONS REGIONAL SITES

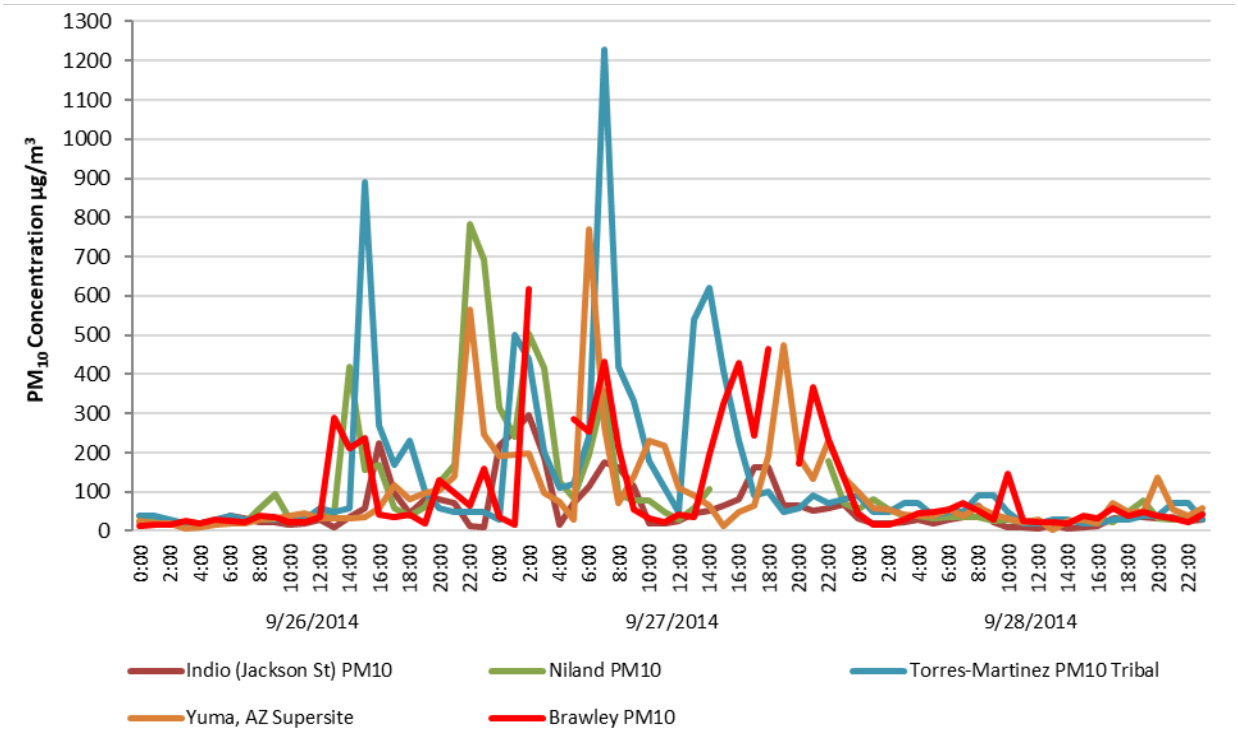


Fig 2-26: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various monitoring locations throughout Riverside, Imperial, and Yuma counties. The elevated PM_{10} concentrations on September 27, 2014, demonstrates the regional nature of the event. Air quality data from the EPA's AQS data bank

[13] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-27
72 HOUR WIND SPEEDS REGIONAL SITES

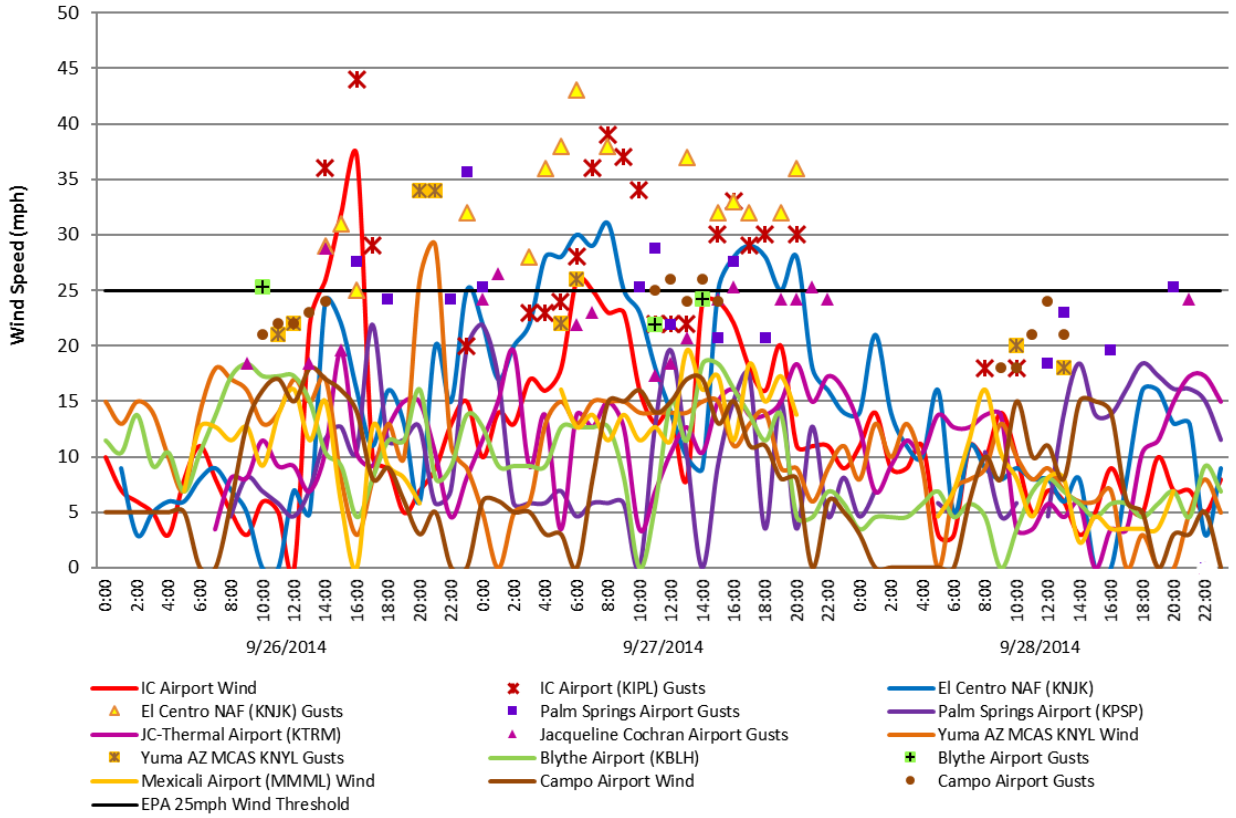


Fig 2-27: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various monitoring locations throughout Riverside, Imperial, and Yuma counties. The elevated winds on September 27, 2014, demonstrates the regional nature of the event. Air quality data from the EPA's AQS data bank

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Brawley monitor on September 27, 2014, compared to non-event and event days demonstrates the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the September 27, 2014 high wind event and the exceedance measured at the Brawley monitor.

Figures 3-1 and 3-2 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley monitor for the period of January 1, 2010 through September 27, 2014. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS.[14] Properly establishing the variability of the event as it occurred on September 27, 2014, 24-hour averaged PM_{10} concentrations between January 1, 2010 and September 27, 2014 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on September 27, 2014, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

[14] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
BRAWLEY HISTORICAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO SEPTEMBER 27, 2014

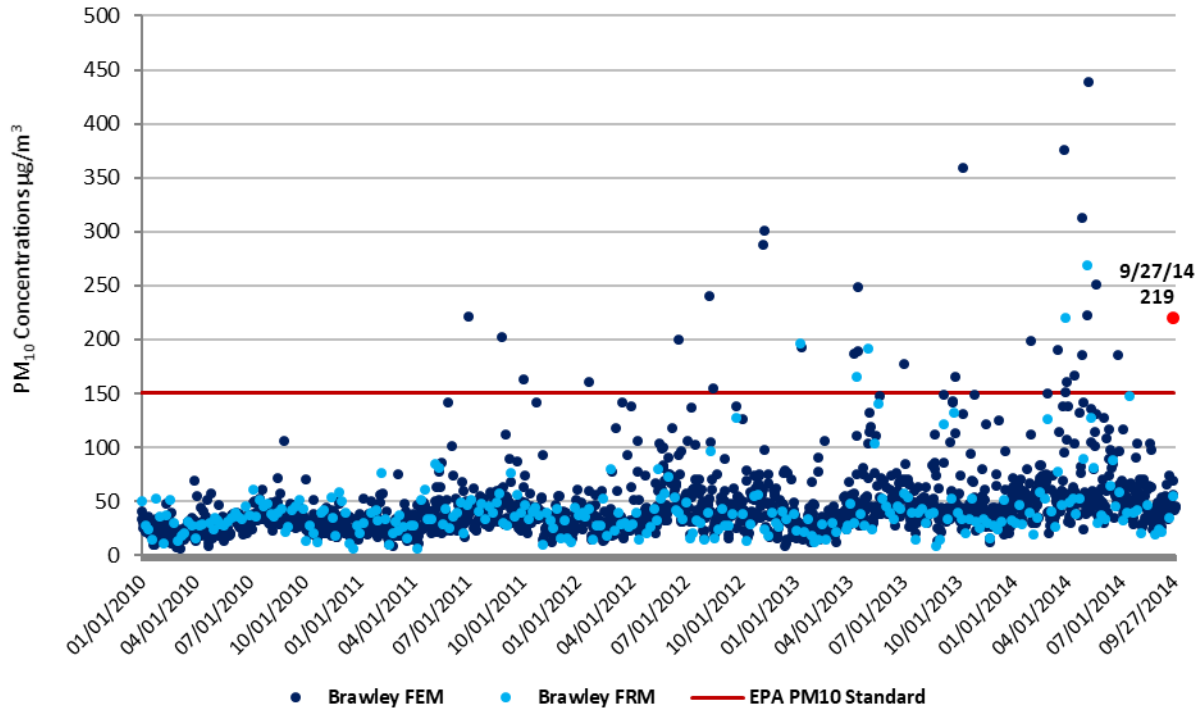
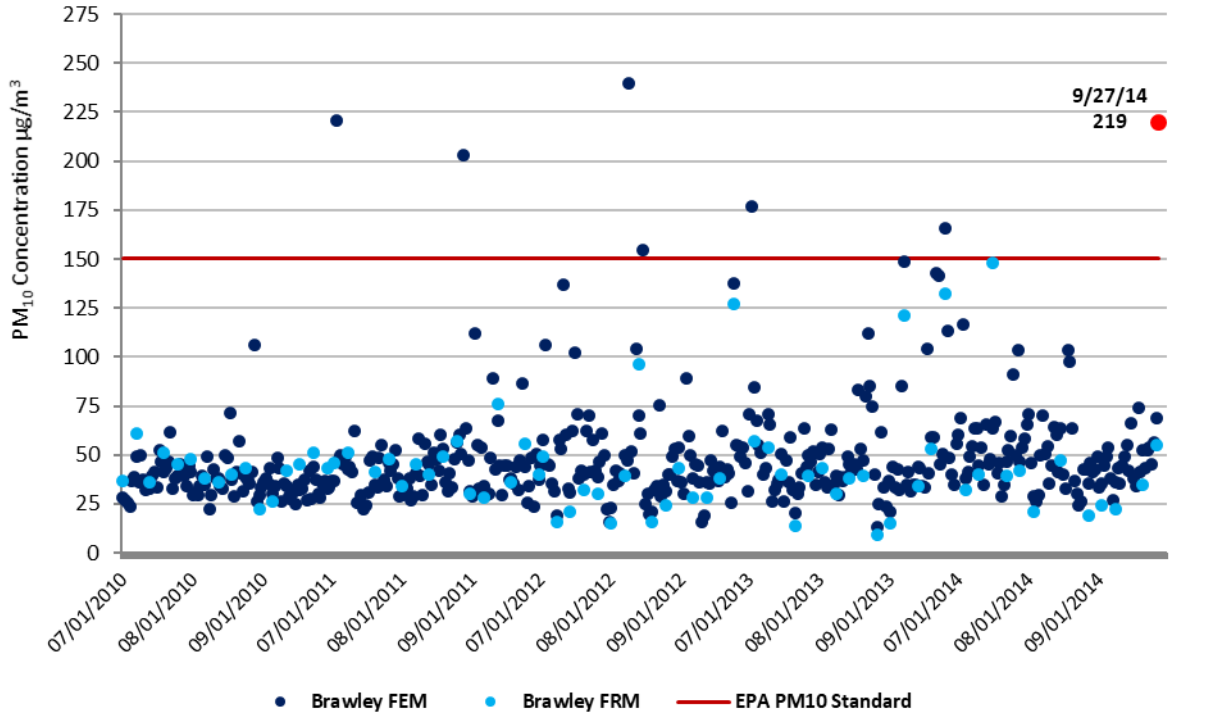


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 219 µg/m^3 on September 27, 2014 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,731 sampling days there were 29 exceedance days which is less than a 2.0% occurrence rate

The time series, **Figure 3-1**, for Brawley includes 2,009 credible samples, measured between January 1, 2010 and September 27, 2014.

Overall, the time series illustrates that the Brawley monitor, measured 29 exceedance days out of the 1,731 sampling days, which is less than a 2.0% occurrence rate. Of the 29 measured exceedance days, six (6) exceedance days occurred during the third quarter (July – September). The remaining 23 exceedance days occurred during the first, second and fourth quarters. The September 27, 2014 concentration is outside the normal historical measurements for the third quarter. No exceedances of the standard occurred during 2010. As mentioned above, FEM BAM data was not regulatory from 2010 to 2012.

FIGURE 3-2
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***JULY 1, 2010 THROUGH SEPTEMBER 27, 2014**



***Quarterly; July 1, 2010 to September 30, 2013 and July 1, 2014 to September 27, 2014**

Fig 3-2: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 219 µg/m^3 by the Brawley monitor on September 27, 2014 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 3-2 displays the seasonal fluctuation over 457 sampling days at the Brawley monitor for third quarter (July to September) between 2010 and 2014. The Brawley monitor measured 530 credible samples over 457 sampling days. Of the 457 sampling days, there were six (6) measured exceedance days, which equates to less than a 1.5% occurrence rate. The September 27, 2014 measured concentration at the Brawley monitor was outside the normal historical and seasonal concentrations when compared to both event days and non-event days.

FIGURE 3-3
BRAWLEY HISTORICAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO SEPTEMBER 30, 2014

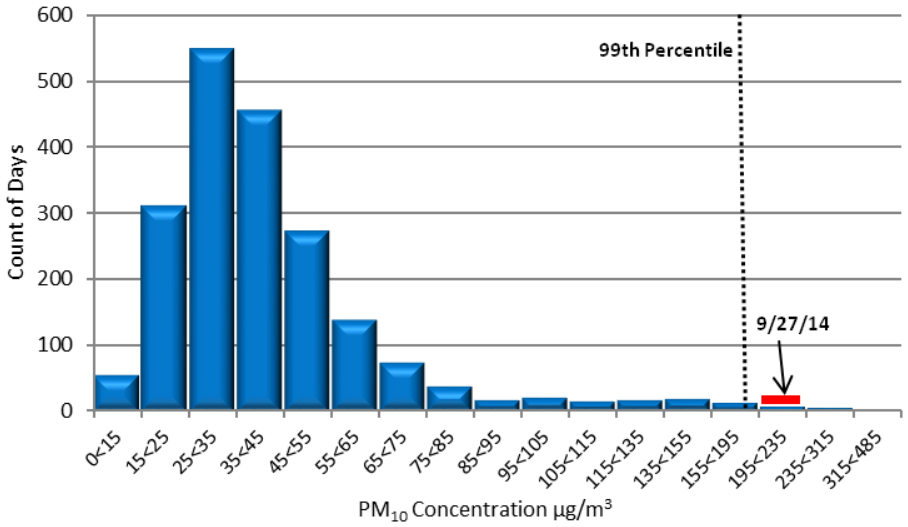
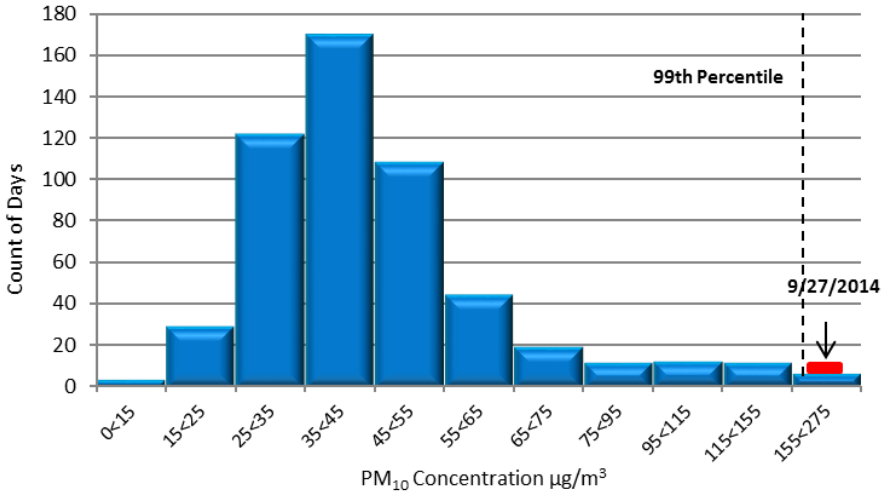


Fig 3-3: The 24-hr average PM_{10} concentrations measured at Brawley monitor demonstrates that the September 27, 2014 event was in excess of the 99th percentile

FIGURE 3-4
BRAWLEY SEASONAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***JULY 1, 2010 THROUGH SEPTEMBER 27, 2014**



***Quarterly; July 1, 2010 to September 30, 2013 and July 1, 2014 to September 27, 2014**

Fig 3-4: The 24-hr average PM_{10} concentration at the Brawley monitoring site demonstrates that the September 27, 2014 event was in excess of the 99th percentile

For the combined FRM and FEM data sets for the Brawley monitor the annual historical and the seasonal historical PM_{10} concentration of 219 µg/m^3 both are above the 99th percentile rank. Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile rankings for both the historical and seasonal patterns the September 27, 2014 measured exceedance is clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on September 27, 2014 occurred infrequently. When comparing the measured PM_{10} level on September 27, 2014 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedance measured at the Brawley monitor was outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the September 27, 2014 natural event affected the concentration levels at the Brawley monitor causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedance on September 27, 2014 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. In order to properly address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures in order to properly consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that are identified as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is considered not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is considered not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for September 27, 2014. In addition, this September 27, 2014 demonstration provides technical and non-technical evidence that strong gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley monitor on September 27, 2014. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the September 27, 2014 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP. On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

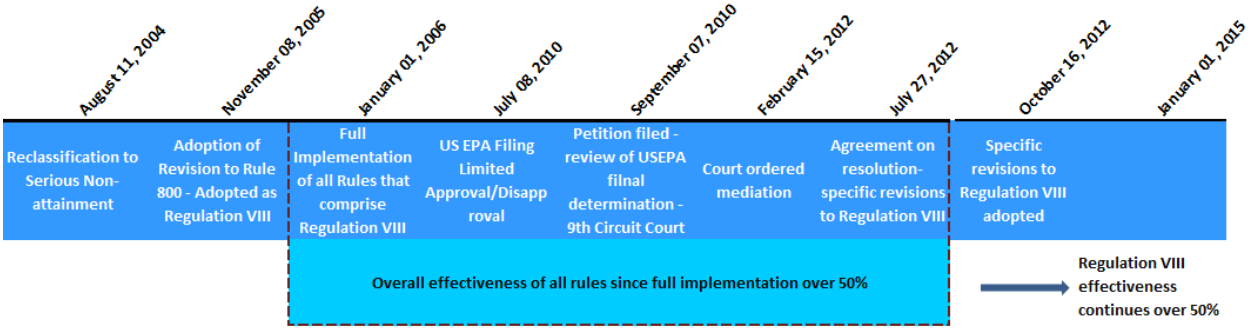


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines were revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines were approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is known as the Good Neighbor Policy. On September 27, 2014 the ICAPCD declared a No Burn day **(Appendix A).** No complaints were filed for agricultural burning on September 27, 2014.

IV.1.c Review of Source-Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Brawley during the time of the September 27, 2014 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as

CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on September 27, 2014, officially declared as a No Burn day, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

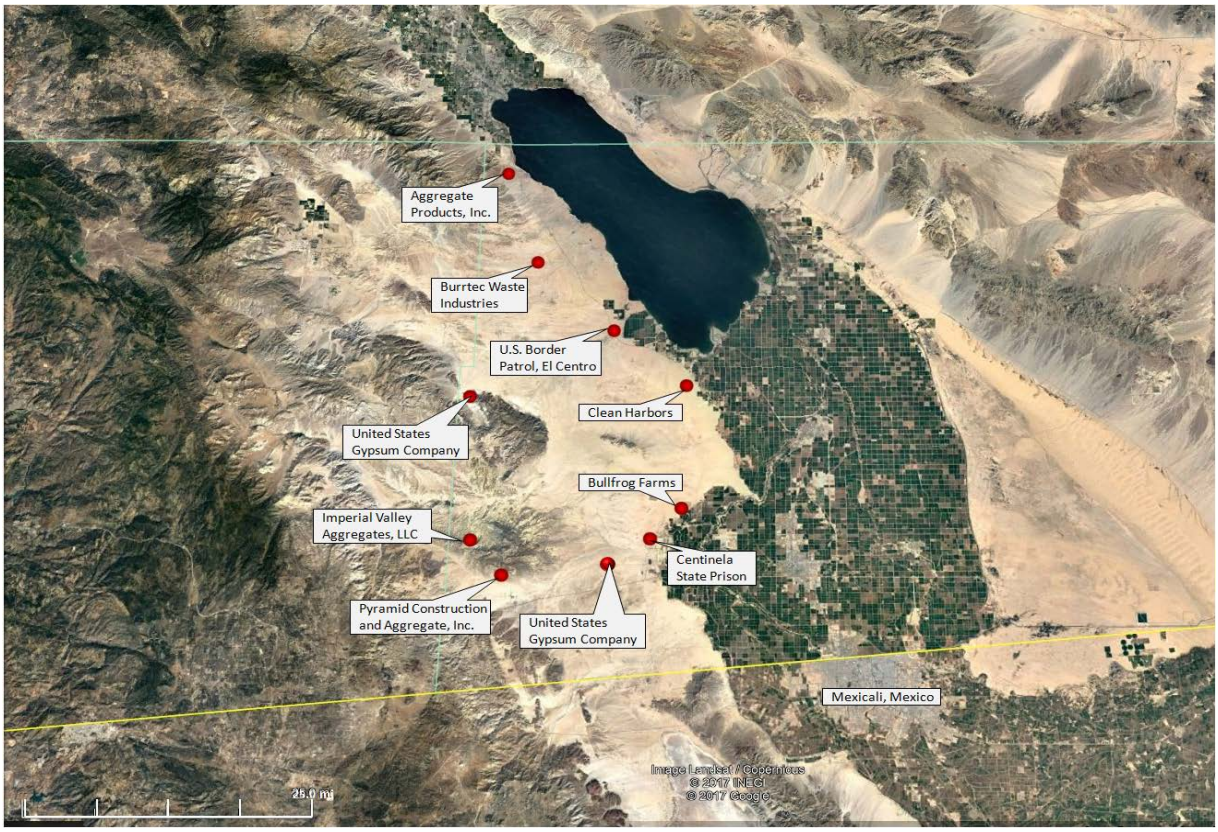


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

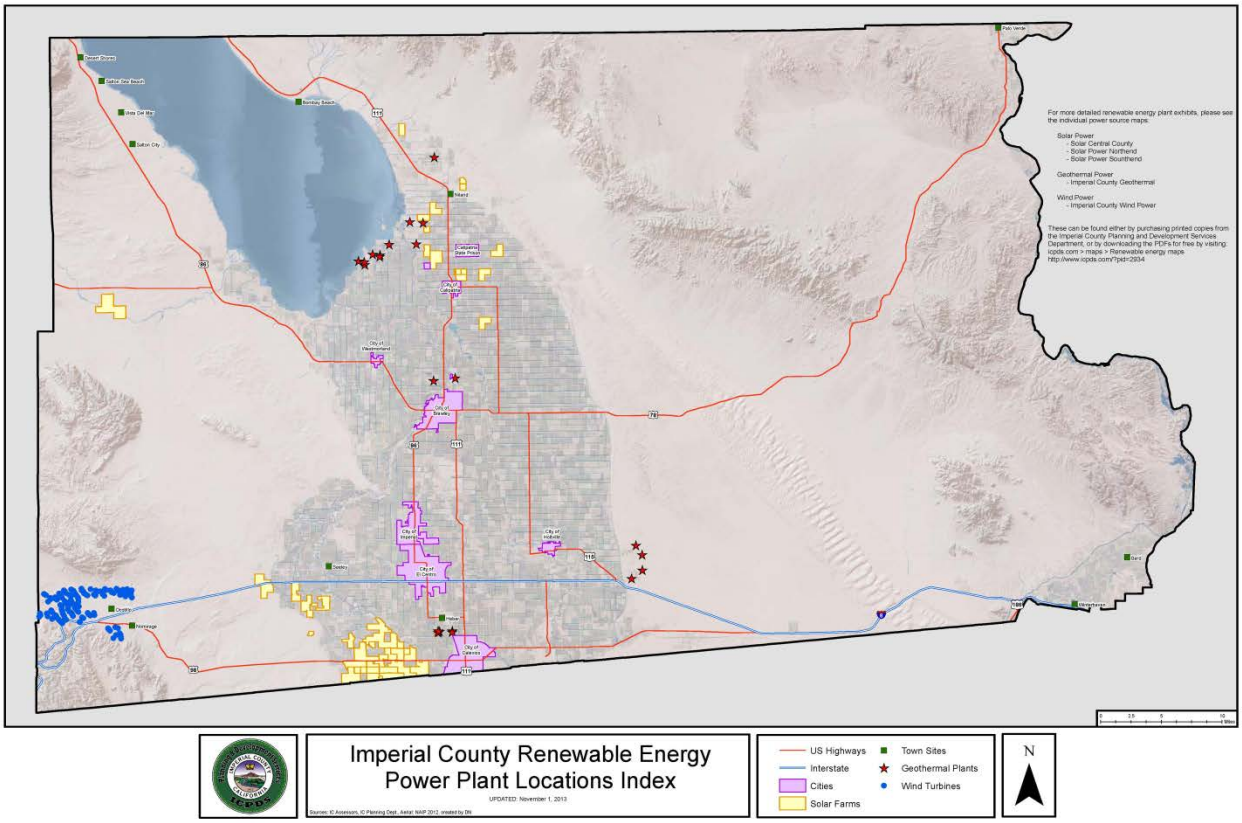


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

The National Weather Service (NWS) issued several notices forecasting winds 15 to 25 mph affecting the region. The NWS Phoenix office issued several notices between September 26, 2014 and September 27, 2014 advising of thunderstorm activity on September 26, 2014 and gusty westerly winds on September 27, 2014. The notices included Urgent Weather Messages, Hazardous Weather Outlooks, and Special Weather Statements containing, wind advisories and a Blowing Dust Advisory for Imperial and Yuma Counties.

At 115 pm PST (215 pm MST) on September 26, 2014 a Special Weather Statement was issued for central Imperial County identifying strong thunderstorms along a line extending from 17 miles northeast of Brawley to 8 miles north of Holtville to Calexico. A Bulletin issued at 220 pm PST (320 pm MST) identified a severe thunderstorm capable of producing dime size hail and damaging winds in excess of 60 mph. By 332 pm PST (432 pm MST) an Urgent Weather Message was issued on September 26, 2014 containing a blowing dust advisory in effect through the evening.

An Air Quality Alert (AQI) at “Unhealthy” levelswas issued by the ICAPCD for Niland at 0800 PDT on September 27, 2014.[15] The notice advised that “People with respiratory or heart disease, the elderly, and children are the groups most at risk, especially when they are physically active. Persons with cardiopulmonary disease and the elderly may experience increased aggravation of heart or lung disease and premature mortality. The general population may experience increased respiratory effects. U.S. EPA cautions that people with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion." **Appendix A** contains copies of issued notices pertinent to the September 27, 2014 exceptional event.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwest Yuma County (Arizona), northern Mexico, and Imperial County. On September 26, 2014 the Imperial County Airport (KIPL) measured three hours of winds over the 25-mph threshold, with a peak gust of 44 mph. The El Centro NAF (KNJK) measured winds at 25 mph with a peak gust of 32 mph on that same day. On September 27, 2014 KIPL measured two hours of winds at 25 mph or above, with a peak gust of 39 mph. On that same day KNJK measured 12 hours of winds at or above the 25-mph threshold, with a peak gust of 43 mph. (See **Table 2-2** for additional wind speeds). Wind speeds over 25 mph are normally sufficient to overcome most PM_{10} control measures. During the September 27, 2014 event wind speeds were at or above the 25-mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that gusty westerly winds created by a strong Pacific low-pressure system that moved through southern California followed a monsoonal unstable airmass from the previous day. Previous day thunderstorm activities loosened soils so that when the gusty westerly winds blew from the San Diego Mountains into the open natural deserts uncontrollable PM_{10} emissions affected Imperial County. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements in the Brawley and surrounding areas to the north and south of Brawley during the event were high enough (at or above 25 mph, with wind gusts over 40 mph) that BACM PM_{10} control measures would have been overwhelmed.

[15]The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. Source: https://airnow.gov/index.cfm?action=aqibasics.aqi

Finally, a high wind dust event can be a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on September 27, 2014 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedance and the high wind event timeline and geographic location. The September 27, 2014 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for September 27, 2014, identified a strong surface low that moved across southern California, leading to an onshore flow that brought strong westerly winds to the mountains and deserts of southeastern California, and specifically Imperial County. As early as September 25, 2014, the San Diego NWS office reported thunderstorm activity over the Anza Borrego Desert where a low-level convergence boundary created by monsoonal air from the south within Mexico. The issued area forecast discussion described a boundary setting up over the San Diego and Imperial County border around 1200 pm PST (100 pm PDT) with south-southeast winds.[16] As a result approximately 20 different notices issued by either the San Diego or Phoenix NWS offices advised of thunderstorm activity September 25, 2014 through September 26, 2014 and gusty westerly winds preceding a trough of low-pressure moving inland over central California, on September 27, 2014. The unstable airmass prior to September 27, 2014 caused thunderstorm activity that loosened soils in Imperial County allowing the gusty westerly winds on September 27, 2014 to transport windblown dust from northern Mexico and from the mountain passes within San Diego County affecting air quality and causing an exceedance at the Brawley monitor.

Entrained windblown dust from natural open areas, particularly from the desert areas west of the Brawley monitor, along with anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations of September 27, 2014.

Figures 5-1 and 5-2 provide pertinent information regarding the tightening of the pressure gradient on September 26, 2014 and September 27, 2014.

[16] Area Forecast Discussion National Weather Service San Diego CA 820 PM PST (920 PM PDT) Thursday, September 25, 2014

FIGURE 5-1
GOES WEST AND EAST SATELLITES SEPTEMBER 26, 2014

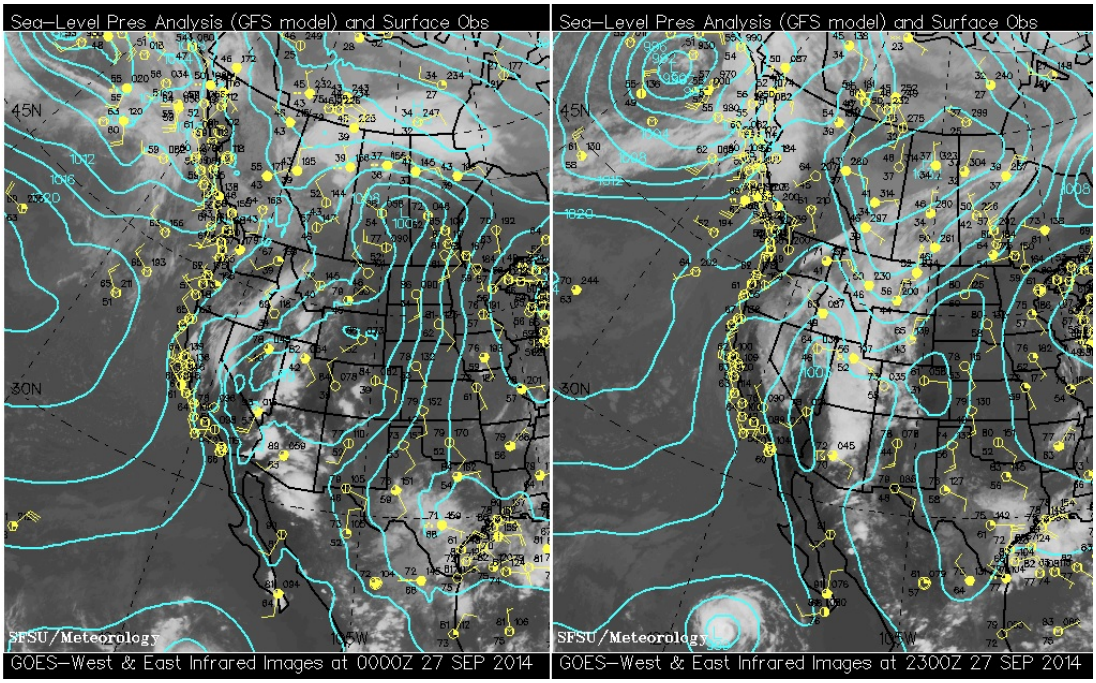


Fig 5-1: A pair of GOES West and East infrared satellite images show the tightening of the pressure gradient (left) on September 26, 2014 (1600 PST). Source: SFSU Department of Earth & Climate Sciences and the California Regional Weather Server: http://squall.sfsu.edu/crws/archive/sathts_arch.html

FIGURE 5-2
SURFACE ANALYSIS MAPS

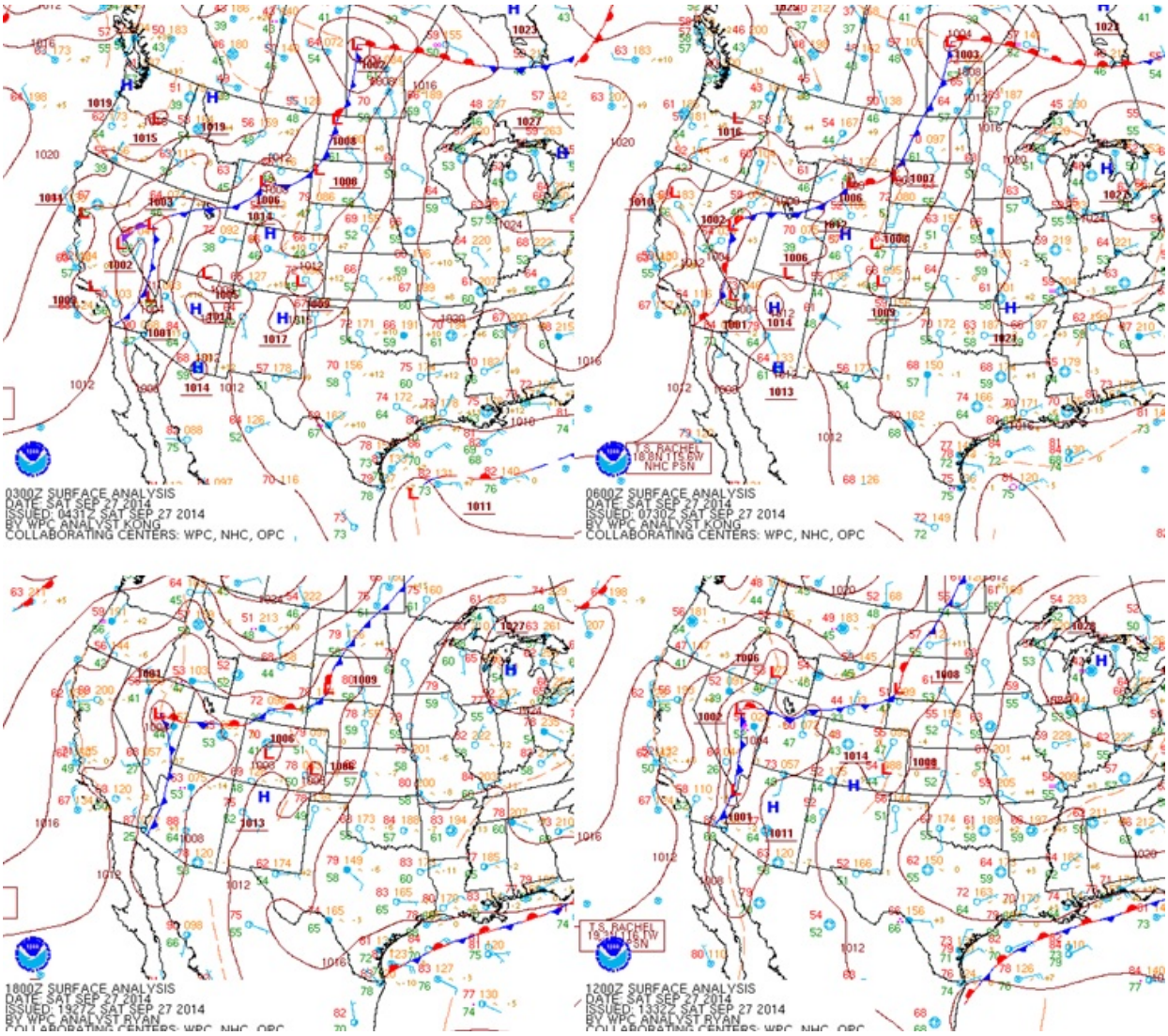


Fig 5-2: Four surface analysis maps show the low pressure and accompanying cold front moving across southern California and into southwestern Arizona. Top two left and right, September 26, 2014 1900 PST and 2200 PST. Bottom two right to left, September 27, 2014 0400 PST and 1000 PST. Although not obvious from the images, NWS notices described monsoonal air moving north. This contributed to unstable weather on September 26, 2014. As the low moved inland winds shifted from a southeasterly direction to a westerly direction by 2000 PST on September 26, 2014. Winds remained westerly and gusty for most of September 27, 2014. Source: Weather Prediction Center Surface Analysis Archives

Figures 5-3 is a satellite image of Aerosol Optical Depth (AOD) or Aerosol Optical Thickness[17] using the Deep Blue[18] Aerosol Optical Depth (AOD) taken over the region at ~1030 PST after monitors measured peak hourly concentrations during the morning. Still the indication of warmer colors support the thickening of aerosols, possibly from suspended particles. While AOD alone does not confirm dust, since AOD may be composed of pollution from factories, smoke from fires, sea salt, volcanic ash, smog or dust, it does support other elements in place on September 27, 2014, such as reduced visibility at airports. Finally, the Aqua satellite made its afternoon pass prior to the peak hourly measured PM_{10} concentrations.

FIGURE 5-3
TERRA MODIS CAPTURES AEROSOLS OVER IMPERIAL COUNTY

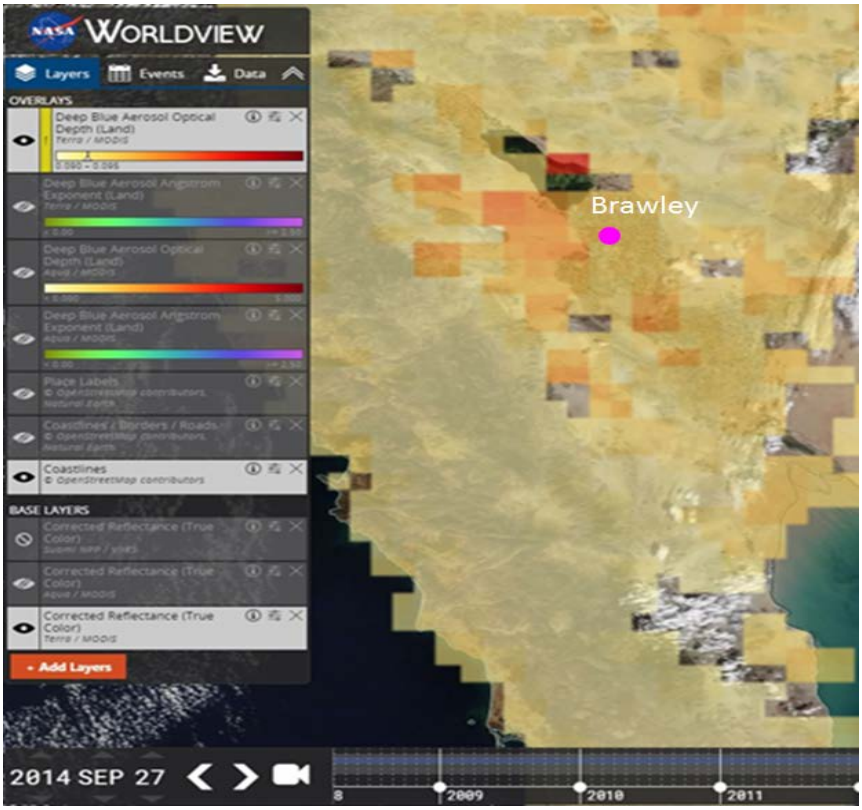


Fig 5-3: At ~ 1030, PST the Terra Satellite captured moderate to heavy patches of aerosols, over Imperial County. Warmer colors indicate increasing thickness of aerosols. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

[17] Aerosol Optical Depth (AOD) (or Aerosol Optical Thickness) indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is "clean" - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Source: https://worldview.earthdata.nasa.gov. and https://deepblue.gsfc.nasa.gov/science

[18] The Deep Blue Aerosol Optical Depth layer is useful for studying aerosol optical depth over land surfaces. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths) where Dark Target approaches fail.

Figure 5-4 is the Deep Blue Angstrom Exponent layer[19] used to discriminate the size of aerosol particles. Increasingly dark shades of green indicate larger aerosols likely to be dust. As can be seen in the legend on the left side of the image, the darkest areas of green just west of Imperial value have a value of <1, making it likely that the aerosols in that area are dust. When analyzing both the thickness (Figure 5-3) and the size (Figure 5-4) of the aerosols the thick layer comprised of large particles is within the western portion of Imperial County and upwind of the Brawley monitor.

FIGURE 5-4
TERRA MODIS CAPTURES AEROSOLS OVER IMPERIAL COUNTY

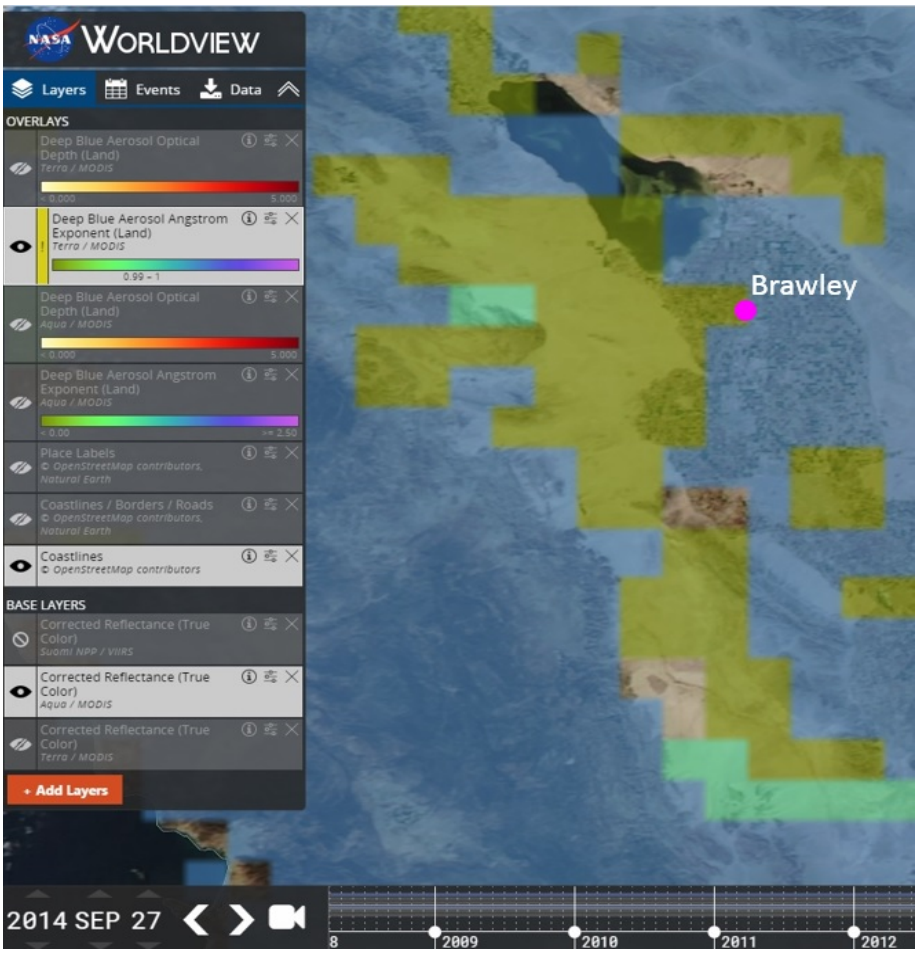


Fig 5-4: Dark green areas indicate aerosols likely to be dust. A particularly thick patch is located over Brawley as captured by the Terra satellite at ~1030 PST. As indicated by the legend on the left part of the image, these aerosols fall way below 1, making them likely dust. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

[19] The MODIS Deep Blue Aerosol Ångström Exponent layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke)

Windblown dust is further supported by NOAA's Satellite Smoke Text Product (effective through 1830 on September 27, 2014), which identified transported windblown dust west of Imperial County (**Appendix A**).

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[20] **Tables 5-1 through 5-5** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at both the Brawley and Niland monitors for September 26, 2014 and September 27, 2014. The Brawley monitor shows peak hourly concentrations following or during the period of high upstream wind speeds. Similarly, note the September 26, 2014, wind speeds and gusts increase at 1400 PST coincident with elevated concentrations in Imperial County. Additionally, a decrease in wind speed as well as a slight shift in wind direction is coincident with measured lower PM_{10} concentrations in Niland and Brawley. As mentioned above, although the Niland monitor measured elevated PM_{10} levels a power failure prevented the measurement of 7 hours of data. It is unclear, if the Niland monitor would have exceeded the NAAQS.

[20] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

TABLE 5-1
WIND SPEEDS AND PM_{10} CONCENTRATIONS IN BRAWLEY SEPTEMBER 26, 2014

Imperial County Airport (KIPL)				El Centro NAF (KNJK)				Yuma, AZ MCAS (KNYL)					Cahuilla Ranger Station (QCAC1)				Brawley	
HR	W/S	W/G	W/D	HR	W/S	W/G	W/D	HR	W/S	W/G	W/D	Obs.	HR	W/S	W/G	W/D	HR	PM_{10} (µg/m³)
53	10		130	56	9		140	57	15		150		10	7	13	115	0	12
153	7		110	156	3		60	157	13		150		110	5	11	98	100	14
253	6		110	256	5		70	257	15		160		210	6	11	91	200	16
353	5		100	356	6		70	357	14		140		310	8	9	102	300	25
453	3		90	456	6		100	457	10		140		410	8	12	92	400	19
553	8		130	556	8		120	557	7		140		510	9	12	95	500	28
653	11		150	656	9		130	657	14		150		610	9	12	102	600	25
753	8		160	756	7		120	757	18		150		710	11	14	123	700	23
853	5		100	856	5		120	857	17		160		810	13	15	132	800	38
953	3		VR	956	0		0	957	16		180		910	12	20	154	900	36
1053	6		110	1056	0		0	1057	13		190		1010	9	18	131	1000	22
1153	5		40	1156	7		60	1157	14	21	190		1110	9	20	179	1100	23
1253	0		0	1256	5		VR	1257	17	22	170		1210	10	22	164	1200	34
1344	**22**	**36**	80	**1356**	**24**	**29**	90	**1357**	**15**		VRB		**1310**	**11**	**19**	150	**1300**	**288**
1440	**26**		110	**1456**	**22**	**31**	100	**1457**	**17**		170		**1410**	**14**	**21**	280	**1400**	**209**
1516	**32**	**44**	140	**1556**	**16**	**25**	150	**1557**	**8**		230		**1510**	**17**	**39**	206	**1500**	**237**
1610	**37**	**29**	190	1656	11		160	1657	3		300		1610	8	**28**	161	1600	43
1753	10		190	1756	16		180	1757	8		250		1710	8	**29**	175	1700	36
1853	9		190	1856	13		200	1857	13		220		1810	3	**14**	146	1800	42
1953	5		240	1956	6		230	1957	10		190		1910	7	**11**	163	1900	20
2053	**7**		270	**2056**	**20**		260	**2057**	**26**	**34**	190		**2010**	**2**	**18**	157	**2000**	**130**
2153	9		260	2156	15		260	2157	**29**	**34**	190	BLDU	2110	3	**10**	74	2100	98
2253	13	**20**	270	2256	**25**	**32**	250	2201	11		170		2210	0	**5**		2200	63
2353	**15**		270	**2356**	**22**		250	**2357**	**9**		200		**2310**	**2**	**7**	357	**2300**	**157**

Wind data for KIPL, KNYL, and KNJK from the NCEI's QCLCD system. Wind data for Cahuilla Ranger Station (QCAC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. BLDU = Blowing Dust. Different instruments measure winds at different intervals therefore, all measured data is compared with the corresponding hour

TABLE 5-2
WIND SPEEDS AND PM_{10} CONCENTRATIONS IN BRAWLEY SEPTEMBER 27, 2014

Seeley (CIO68)				Imperial County Airport (KIPL)				El Centro NAF (KNJK)				Fish Creek Mountains (FHCC1)				Brawley	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM_{10} ($\mu g/m^3$)
0	15		255	53	10		260	56	17		250	26	14	23	202	0	36
100	14		266	153	14		290	156	20		270	126	18	25	196	100	15
200	9.1		318	253	13	23	290	256	22	28	270	226	17	27	197	200	617
300	13		299	353	17	23	290	356	28	36	270	326	17	32	228	300	
400	21		285	453	16	24	320	456	28	38	270	426	9	21	200	400	
500	25		285	553	18	28	270	556	30	43	260	526	6	19	178	500	284
600	26		280	653	26	36	290	656	29		270	626	12	23	169	600	253
700	25		295	753	25	39	290	756	31	38	280	726	7	19	89	700	433
800	24		300	853	23	37	270	856	25		260	826	6	17	1	800	215
900	23		303	953	23	34	280	956	23		240	926	4	21	282	900	54
1000	18		294	1053	16	22	250	1056	18		250	1026	5	13	51	1000	31
1100	15		271	1153	13	22	260	1156	14		210	1126	4	12	59	1100	23
1200	13		265	1253	14	22	270	1256	10	37	290	1226	12	24	259	1200	41
1300	18		254	1353	8		280	1356	9		290	1326	12	28	350	1300	34
1400	20		254	1453	24	30	240	1456	25	32	230	1426	12	34	329	1400	195
1500	20		253	1553	24	33	240	1556	28	33	240	1526	8	26	280	1500	325
1600	21		250	1653	22	29	250	1656	29	32	250	1626	13	26	256	1600	429
1700	18		264	1753	18	30	270	1756	28		240	1726	9	23	334	1700	244
1800	22		267	1853	16		260	1856	25	32	240	1826	3	24	76	1800	464
1900	17		287	1953	20	30	260	1956	28	36	250	1926	5	17	33	1900	
2000	17		283	2053	11		250	2056	18		260	2026	4	14	284	2000	172
2100	17		273	2153	11		270	2156	16		260	2126	3	6	140	2100	367
2200	15		274	2253	11		270	2256	14		280	2226	6	12	207	2200	234
2300	13		284	2353	9		290	2356	14		260	2326	6	8	243	2300	136

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Fish Creek Mountains (FHCC1) and Seeley (CI068) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Different instruments measure winds at different intervals therefore, all measured data is compared with the corresponding hour

TABLE 5-3
WIND SPEEDS AND PM_{10} CONCENTRATIONS IN BRAWLEY SEPTEMBER 27, 2014

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				Ocotillo Wells (AS398/KD6RSQ5)				Mount Laguna (HP001)				Brawley	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM_{10} ($\mu g/m^3$)
50	24	42	217	50	7	13	254	55	16	25	323	50	19	30	207	0	36
150	26	37	225	150	14	26	197	155	24	39	335	150		23	229	100	15
250	30	42	205	250	22	34	228	255	11	21	314	250	37	44	217	200	617
350	23	40	222	350	22	35	241	355	17	25	342	350		46	222	300	
450	26	39	210	450	20	33	249	453	17	29	339	450		22	205	400	
550	25	38	221	550	20	30	247	556	14	27	300	550	29	37	219	500	284
650	25	41	225	650	16	25	245	655	9	27	325	650		33	218	600	253
750	26	37	227	750	20	28	226	755	17	30	318	750	27	38	224	700	433
850	24	42	229	850	22	31	231	858	14	27	309	850	30	36	222	800	215
950	22	37	226	950	14	24	242	950	11	18	352	950	27	31	240	900	54
1050	21	37	241	1050	16	27	236	1055	9	20	314	1050	29	33	234	1000	31
1150	28	40	221	1150	13	30	252	1155	13	29	316	1150	28	35	234	1100	23
1250	23	39	242	1250	14	24	253	1256	13	26	325	1250	39	42	239	1200	41
1350	26	39	231	1350	14	27	260	1355	16	28	322	1350		46	236	1300	34
1450	29	46	226	1450	9	17	230	1455	16	34	308	1450	39	45	241	1400	195
1550	27	42	227	1550	13	22	249	1555	15	42	308	1550	42	48	228	1500	325
1650	27	44	227	1650	9	17	244	1655	13	28	297	1650		46	231	1600	429
1750	31	40	222	1750	7	19	246	1755	11	20	322	1750	38	41	234	1700	244
1850	29	45	237	1850	10	16	284	1855	13	22	314	1850	41	43	228	1800	464
1950	30	45	222	1950	15	26	307	1956	12	19	322	1950		45	225	1900	
2050	30	49	214	2050	14	20	305	2052	13	21	302	2050	36	39	232	2000	172
2150	33	49	210	2150	18	23	275	2155	13	20	308	2150	38	42	231	2100	367
2250	30	49	214	2250	6	15	83	2251	14	24	330	2250	31	38	238	2200	234
2350	29	44	221	2350	12	20	241	2355	15	24	305	2350	39	41	228	2300	136

Wind data for Mountain Springs Grade (TNSC1), Sunrise-Ocotillo (IMPSD), Ocotillo Wells (AS398/KD6RSQ5), and Mount Laguna (HP001) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Different instruments measure winds at different intervals therefore, all measured data is compared with the corresponding hour

TABLE 5-4
WIND SPEEDS AND PM_{10} CONCENTRATIONS IN NILAND SEPTEMBER 26, 2014

Ocotillo Wells (AS398/KD6RSQ5)				Imperial County Airport (KIPL)				El Centro NAF (KNJK)				Fish Creek Mountains (FHCC1)				Niland	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM_{10} ($\mu g/m^3$)
55	8	11	69	53	10		130	56	9		140	26	4	14	192	0	23
155	5	9	130	153	7		110	156	3		60	126	2	7	300	100	22
250	0	0	123	253	6		110	256	5		70	226	0	4		200	20
350	1	3	73	353	5		100	356	6		70	326	3	6	308	300	16
415	3	5	56	453	3		90	456	6		100	426	2	8	93	400	16
535			50	553	8		130	556	8		120	526	0	3		500	21
655	5	7	108	653	11		150	656	9		130	626	1	5	214	600	24
745	5	8	130	753	8		160	756	7		120	726	1	5	298	700	21
849	5	9	155	853	5		100	856	5		120	826	2	5	325	800	57
952	6	10	263	953	3		VR	956	0		0	926	1	5	73	900	94
1050	8	13	140	1053	6		110	1056	0		0	1026	3	7	337	1000	32
1145	8	14	113	1153	5		40	1156	7		60	1126	4	11	33	1100	32
1254	12	18	103	1253	0		0	1256	5		VR	1226	10	15	47	1200	35
1355	7	23	118	1344	22	36	80	1356	24	29	90	1326		18	187	1300	43
1455	**19**	**31**	169	**1440**	**26**		110	**1456**	**22**	**31**	100	**1426**	**13**	**25**	211	**1400**	**418**
1556	**17**	**28**	88	**1516**	**32**	**44**	140	**1556**	**16**	**25**	150	**1526**	**14**	**27**	204	**1500**	**155**
1655	**20**	**32**	116	**1610**	**37**	**29**	190	**1656**	**11**		160	**1626**	**15**	**27**	214	**1600**	**169**
1755	19	29	161	1753	10		190	1756	16		180	1726	16	25	198	1700	59
1855	16	28	158	1853	9		190	1856	13		200	1826	17	29	217	1800	39
1955	11	27	180	1953	5		240	1956	6		230	1926		29	201	1900	60
2055	**20**	**30**	272	**2053**	**7**		270	**2056**	**20**		260	**2026**	**17**	**29**	204	**2000**	**123**
2155	**11**	**19**	278	**2153**	**9**		260	**2156**	**15**		260	**2126**	**13**	**26**	227	**2100**	**169**
2255	**11**	**20**	272	**2253**	**13**	**20**	270	**2256**	**25**	**32**	250	**2226**	**11**	**23**	196	**2200**	**784**
2352	**15**	**24**	305	**2353**	**15**		270	**2356**	**22**		250	**2326**	**8**	**13**	243	**2300**	**692**

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Fish Creek Mountains (FHCC1) and Seeley (CI068) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Due to the different times that air quality and wind data is measured at various sites, the hour represents the hour in which the measurement was taken, and not necessarily the exact time

TABLE 5-5
WIND SPEEDS AND PM_{10} CONCENTRATIONS IN NILAND SEPTEMBER 27, 2014

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				Ocotillo Wells (AS398/KD6RSQ5)				Borrego Springs (BRGSD)				Niland	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM_{10} ($\mu g/m^3$)
50	24	42	217	50	7	13	254	55	16	25	323	50	6	9	190	0	315
150	26	37	225	150	14	26	197	155	24	39	335	150	9	18	332	100	241
250	30	42	205	250	22	34	228	255	11	21	314	250	5	13	29	200	504
350	23	40	222	350	22	35	241	355	17	25	342	350	4	9	98	300	415
450	26	39	210	450	20	33	249	453	17	29	339	450	4	5	40	400	126
550	25	38	221	550	20	30	247	556	14	27	300	550	4	5	25	500	83
650	25	41	225	650	16	25	245	655	9	27	325	650	9	12	93	600	194
750	26	37	227	750	20	28	226	755	17	30	318	750	7	13	13	700	357
850	24	42	229	850	22	31	231	858	14	27	309	850	6	11	69	800	93
950	22	37	226	950	14	24	242	950	11	18	352	950	6	11	72	900	78
1050	21	37	241	1050	16	27	236	1055	9	20	314	1050	10	17	182	1000	76
1150	28	40	221	1150	13	30	252	1155	13	29	316	1150	16	23	271	1100	50
1250	23	39	242	1250	14	24	253	1256	13	26	325	1250	14	21	277	1200	27
1350	26	39	231	1350	14	27	260	1355	16	28	322	1350	6	14	250	1300	58
1450	29	46	226	1450	9	17	230	1455	16	34	308	1450	9	14	282	1400	106
1550	27	42	227	1550	13	22	249	1555	15	42	308	1550	10	22	311	1500	
1650	27	44	227	1650	9	17	244	1655	13	28	297	1650	12	17	279	1600	
1750	31	40	222	1750	7	19	246	1755	11	20	322	1750	6	12	242	1700	
1850	29	45	237	1850	10	16	284	1855	13	22	314	1850	6	13	359	1800	
1950	30	45	222	1950	15	26	307	1956	12	19	322	1950	7	14	239	1900	
2050	30	49	214	2050	14	20	305	2052	13	21	302	2050	5	10	340	2000	
2150	33	49	210	2150	18	23	275	2155	13	20	308	2150	3	4	96	2100	
2250	30	49	214	2250	6	15	83	2251	14	24	330	2250	4	7	259	2200	179
2350	29	44	221	2350	12	20	241	2355	15	24	305	2350	5	7	171	2300	71

Wind data for Mountain Springs Grade (TNSC1), Sunrise-Ocotillo (IMPSD), Ocotillo Wells (AS398/KD6RSQ5), and Borrego Springs (BRGSD) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Between the hours of 1500 to 2100 station power outage. Due to the different times that air quality and wind data is measured at various sites, the hour represents the hour in which the measurement was taken, and not necessarily the exact time

As discussed above, as early as September 25, 2014, the San Diego NWS office reported thunderstorm activity over the Anza Borrego Desert and a description of a boundary setting up over the San Diego and Imperial County border around 1200 pm PST (100 pm PDT) with south-southeast winds.[21] Observations indicate that the elevated PM_{10} began the day before, September 26, 2014 when thunderstorm-fueled winds from the south-southeast swept over portions of southeastern California. Essentially, a shifting wind direction over a two-day period combined with west winds on September 27, 2014 allowed for previously suspended windblown dust to combine with windblown dust from the west on September 27, 2014 affecting air quality

[21] Area Forecast Discussion National Weather Service San Diego CA 820 PM PST (920 PM PDT) Thursday, September 25, 2014

in Imperial County. As a result, approximately 20 different notices issued by either the San Diego or Phoenix NWS offices advised of thunderstorm activity September 25, 2014 through September 26, 2014 and gusty westerly winds preceding a trough of low-pressure moving inland over central California, on September 27, 2014. These notices included, Urgent Weather Messages, containing wind advisories for areas including the Coachella Valley and the San Diego County deserts, an Air Quality Alert for Yuma County, Special Weather Statements identifying thunderstorms in Imperial County, Bulletins, Hazardous Weather Outlooks identifying gusty winds and blowing dust, Flood Advisory, Severe Weather Statements and Preliminary Local Storm Report. All identified gusty winds and reduced visibility from either thunderstorm activity or gusty west winds.

Overall, during the evening of September 26, 2014, winds shifted westerly as a low pressure began to establish itself. Winds during the early morning of September 27, 2014 blew from the west-northwest of Brawley. During the day, airflow shifted so that winds approached almost due west. This provided for previously transported windblown dust to combine with windblown dust from the mountains located in San Diego County. This shift in wind direction, combined with strong winds that were sustained over many hours, along with residual dust suspended in the air from gusty winds on September 26, 2014, were key meteorological factors in causing the exceedance.

Figure 5-5 is a graphical depiction that provides a detailed analysis of meteorological events leading up to the exceedance measured by the Brawley monitor on September 27, 2014.

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FIGURE 5-5
TIME SEQUENCE OF ENTRAINMENT SEPTEMBER 27, 2014

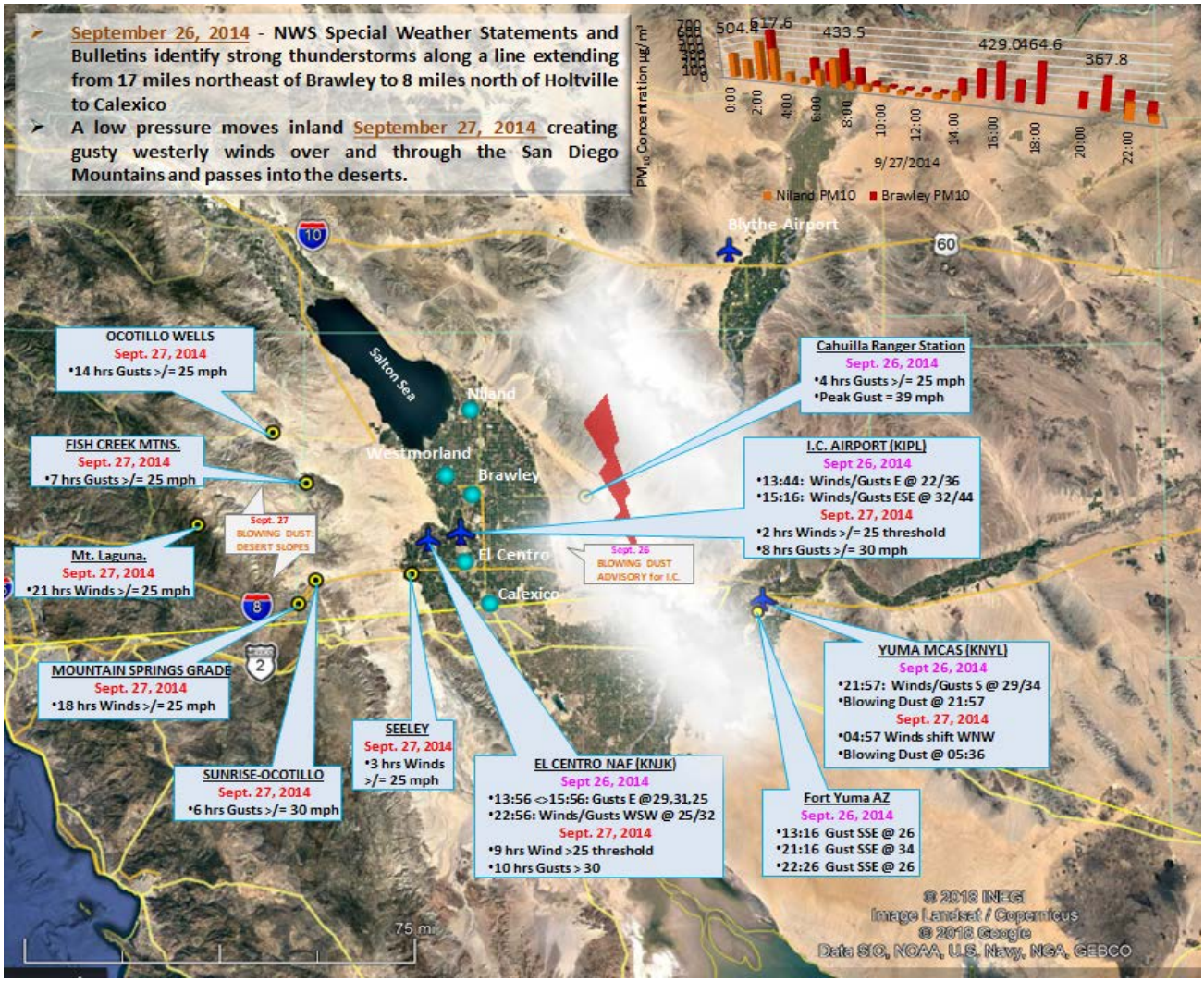

Fig 5-5: The time sequence above provides a detailed analysis of existing meteorological factors on September 26, 2014 and September 27, 2014 responsible for the exceedance measured by the Brawley monitor on September 27, 2014. Google Earth base map

Figures 5-6 through 5-8 demonstrates the relationship between the PM_{10} concentrations and wind speeds over a 72-hour period at Brawley. Since the Brawley station does not measure wind speed, the two nearest airports were used. The correlation of hourly PM_{10} concentrations from the Brawley monitor and the elevated wind speeds on September 27, 2014 indicate that as wind speeds increased so did concentrations of PM_{10}. Fluctuations in hourly concentrations at Brawley over 72 hours show a positive correlation with wind speeds, and gusts, at Imperial County Airport (KIPL) and El Centro NAF (KNJKL), along with other upstream wind speeds.

FIGURE 5-6
PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

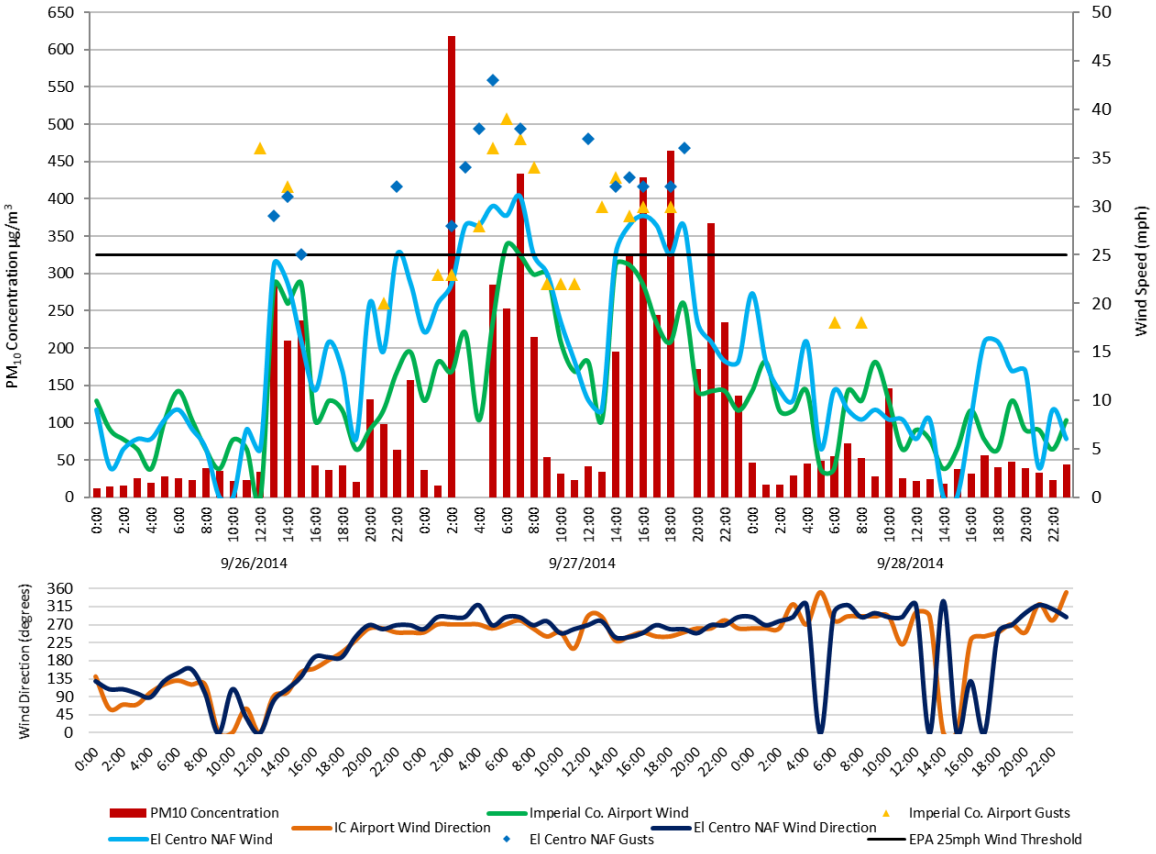

Fig 5-6: Fluctuations in hourly concentrations over 96 hours show a positive correlation with wind speeds, and particularly gusts, at Imperial County Airport (KIPL) and El Centro NAF (KNJKL). Brawley station does not measure wind. Black line indicates 25 mph threshold. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

In order to understand the totality of the regional effect and the effect to the Brawley monitor, **Figures 5-7 to 5-9** are three-day graphs, September 26, 2014 through September 28, 2014, using stations located E-to-SSE and upstream of the Brawley monitor. Together, all three graphs help illustrate the elevated concentrations and their correlation to elevated wind speeds and reduced visibility. The elevated measured winds on September 26, 2014, primarily from a south-southeast direction resulted from thunderstorm activity while the elevated gusty westerly winds measured on September 27, 2014 resulted from the Pacific trough moving inland. For detailed meteorological station graphs and PM_{10} concentrations at individual stations, see **Appendices B and C**.

FIGURE 5-7
PM_{10} CONCENTRATIONS AND UPSTREAM WIND SPEED CORRELATION

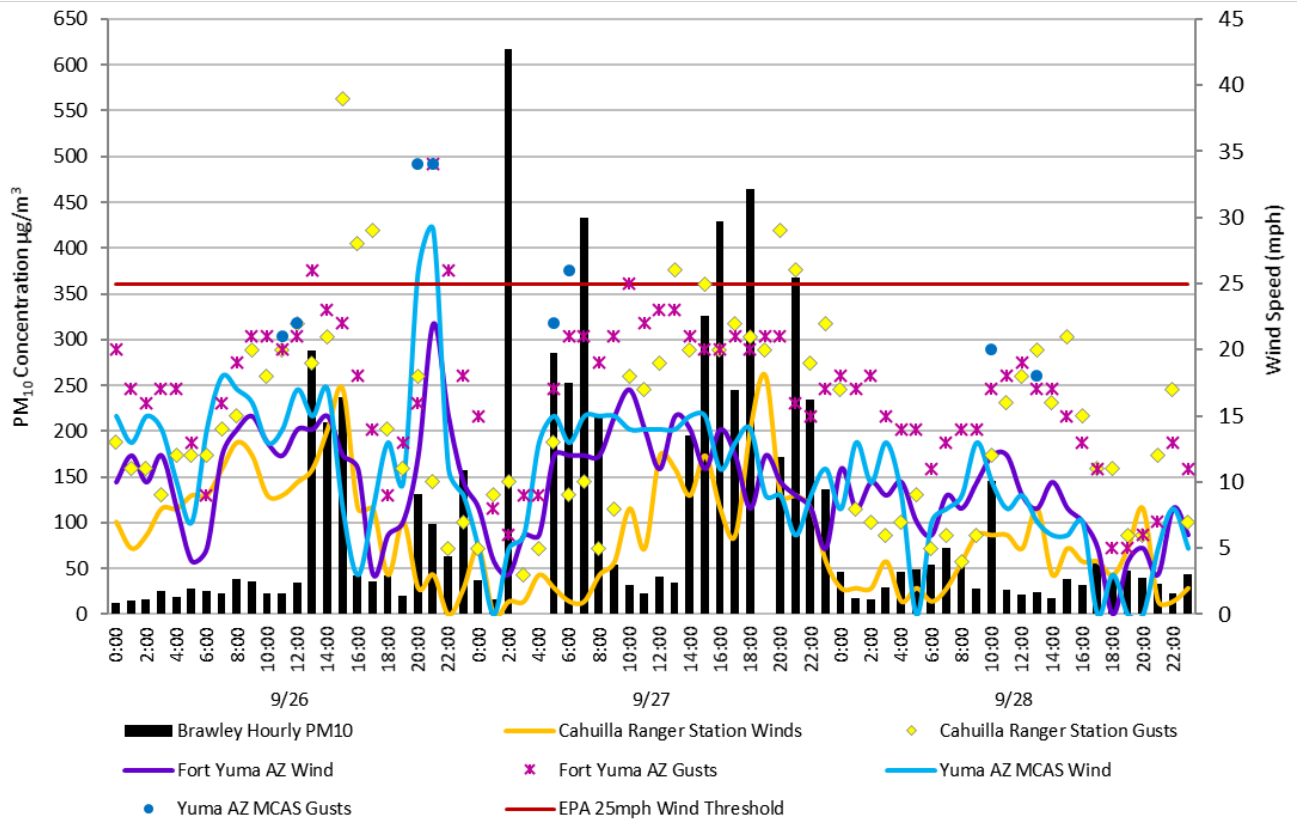

Fig 5-7: The elevated winds on September 26, 2014 resulted from thunderstorm activity while the elevated winds on September 27, 2014 resulted from the Pacific trough. Elevated PM_{10} concentrations show a positive correlation to an in increase in elevated wind speeds at upstream sites. Wind on September 26, 2014 originated from thunderstorm activity from the south, southeast while the elevated westerly wind measured on September 27, 2014 resulted from a Pacific trough. Air quality data from the EPA's AQS data bank. Wind data from the University of Utah's MesoWest system and the NCEI's QCLCD

FIGURE 5-8
PM_{10} CONCENTRATIONS AND UPSTREAM WIND SPEED CORRELATION

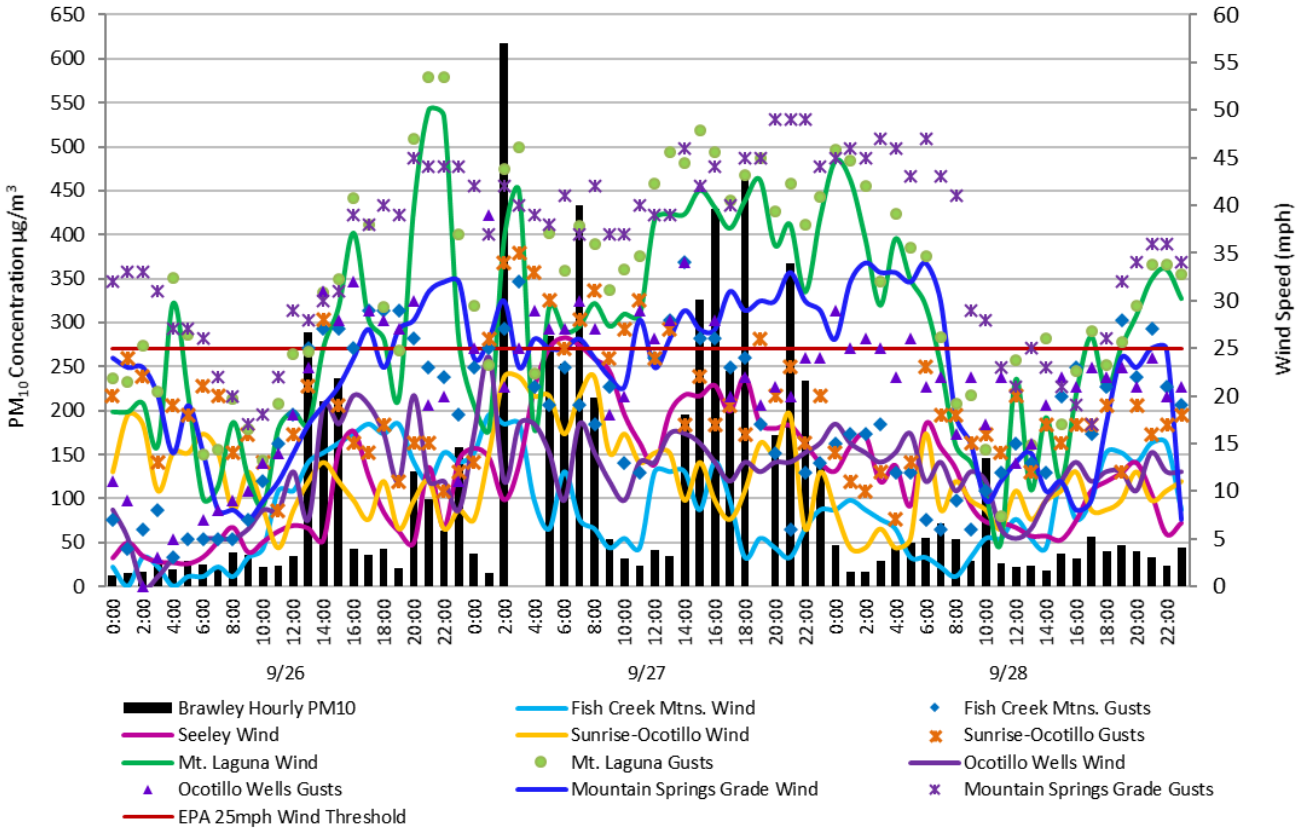

Fig 5-8: This graph is a collection of upstream wind sites, from the WNW and W that measured elevated winds on September 26, 2014 and September 27, 2014. Like the previous graph the elevated winds measured on September 26, 2014 resulted from thunderstorm activity while the elevated winds measured on September 27, 2014 resulted from the Pacific trough. Elevated PM_{10} concentrations show a positive correlation to an in increase in elevated wind speeds at upstream sites. Air quality data from the EPA's AQS data bank. Wind data from the University of Utah's MesoWest system

Figure 5-9 compares the 72-hour concentrations measured at the Brawley monitor for three days, September 26, 2014 through September 28, 2014 with visibility.[22] Imperial County Airport (KIPL) reported haze and visibility of four miles at 1516 on September 26, 2014. This worsened on September 27, 2014. At 0412 visibility dropped to 1.25 miles. El Centro NAF (KNJK) reported haze and visibility at three miles at 0343.

[22] According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; http://www.nws.noaa.gov/asos/vsby.htm

FIGURE 5-9
72 HOUR TIME SERIES PM_{10} CONCENTRATIONS AND VISIBILITY

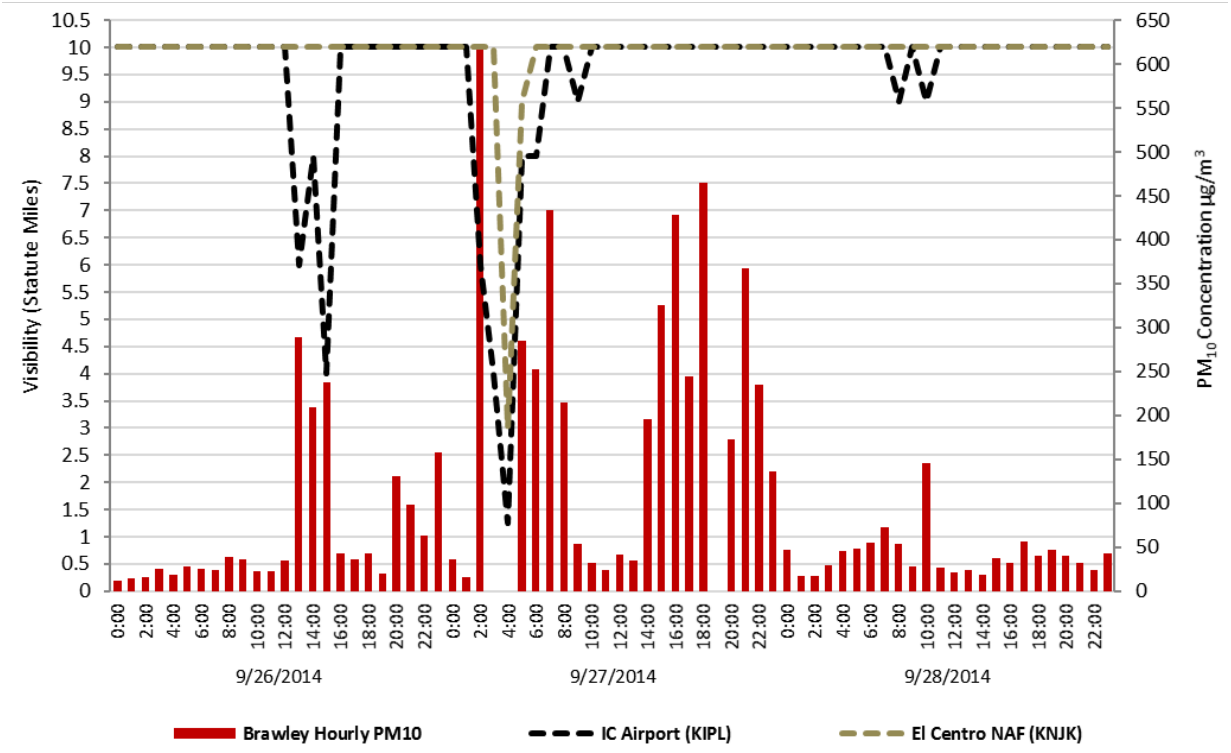

Fig 5-9: Illustrates observed visibility levels as reported from the Imperial County Airport (KIPL) on September 27, 2014, relative to PM_{10} concentrations. Air quality data from the EPA's AQS data bank. Wind data from the NCEI's QCLCD system

As previously discussed, the San Diego NWS office issued seven (7) Urgent Weather Messages containing wind advisories for the Riverside County Mountains, San Diego County Mountains, Coachella Valley and San Diego County Deserts as early as September 25, 2014. The advisories identified areas along Coachella Valley and Interstate 8, which included winds 25 to 35 mph, with gusts of 45 to 55 mph and reduced visibility due to blowing dust. A useful measurement of the degradation of air quality is the Air Quality Index (AQI).[23]

Figure 5-10 provides the resultant AQI for September 27, 2014. As the trough moved inland with onshore flow the level of reduced air quality became evident when the AQI level changed from a "Moderate" or Yellow level to an "Unhealthy for Sensitive Groups" or Orange level. The lower air quality affirms that on September 27, 2014 gusty west winds transported windblown dust into Imperial County affecting air quality.

[23] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country.

FIGURE 5-10
AIR QUALITY INDEX FOR BRAWLEY SEPTEMBER 27, 2014

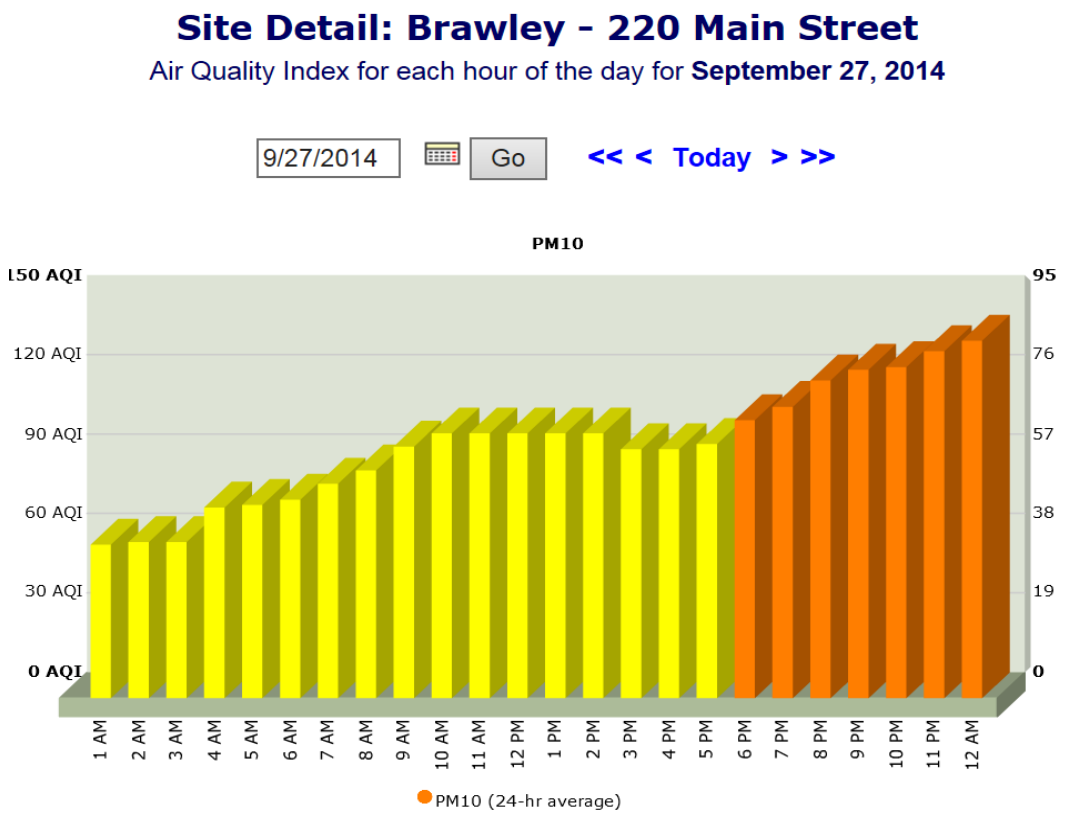

Fig 5-10: Demonstrates that air quality in Imperial County was affected when high winds associated with a trough of low-pressure moved inland eastward on September 27, 2014. As the trough of low pressure moved inland and across California, the onshore gradient caused westerly winds in the mountains and deserts of San Diego County that transported windblown dust into Imperial County affecting air quality and causing an exceedance at the Brawley monitor

V.2 Summary

The preceding discussion, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the strong and gusty winds created by thunderstorms associated with unstable monsoonal air on September 26, 2014, and a low-pressure system that moved through southern California on September 27, 2014. The establishment of the low over the area on September 27, 2014 led to prolonged gusty westerly winds over southeastern California. The information provides a clear causal relationship between the transported windblown dust and the PM_{10} exceedance measured at the Brawley monitor on September 27, 2014. Furthermore, the advisories and issued air quality alert illustrate the affect upon air quality within the region extending from all of Imperial County and the southern portion of Riverside County and Yuma, Arizona. Large amounts of coarse particles (dust) and PM_{10} loosened sufficiently by thunderstorm activity on September 26, 2014 were transported into the

lower atmosphere by strong westerly winds originating within the mountain and desert areas of San Diego County on September 27, 2014. Combined, the information demonstrates that the elevated PM_{10} concentrations measured on September 27, 2014 coincided with high wind speeds, and that strong winds were experienced over the southern portion of Riverside County, all of Imperial County, and southwestern Arizona affecting air quality.

FIGURE 5-11
SEPTEMBER 27, 2014 WIND EVENT TAKEAWAY POINTS

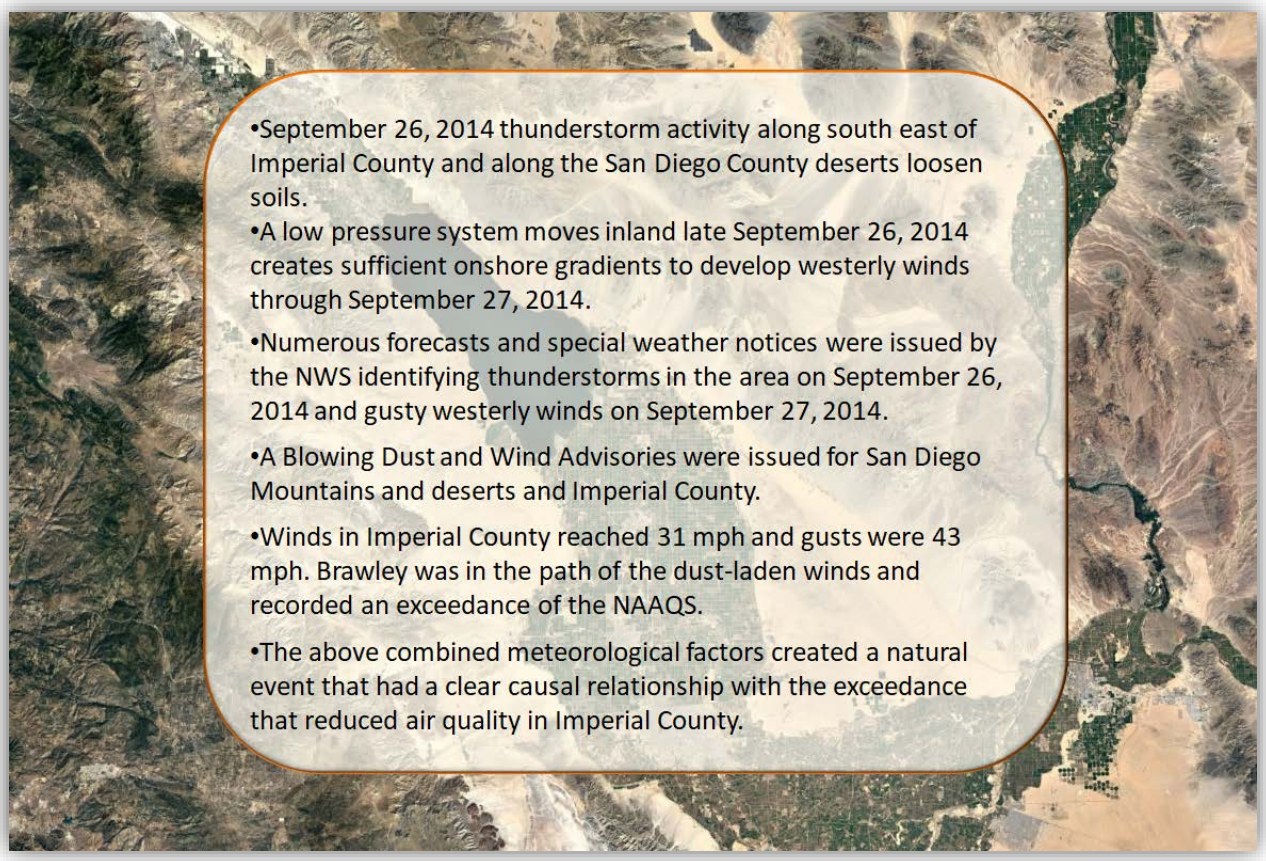

Fig 5-11: Illustrates the factors that qualify the September 27, 2014 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedance that occurred on September 27, 2014, satisfies the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

	TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})	DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-34
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	48-66
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	35-39
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	40-47
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	40-66

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the September 27, 2014 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be "not reasonably controllable or preventable" (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This

demonstration provides evidence that despite BACM in place within Imperial County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Brawley monitor caused by naturally occurring strong gusty west winds transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west and southwest of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at Brawley on September 27, 2014, were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The criteria that human activity played little or no direct causal role occurs when the event, along with its resulting emissions, are solely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled. As discussed within this demonstration, windblown dust anthropogenic sources reasonably controlled with BACM in and around Brawley on September 27, 2014 meet the criteria that human activity played little or no direct causal role therefore, the event qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley during different days, and the comparative analysis of different monitors in Imperial and Riverside counties demonstrates a consistency of elevated gusty westerly winds and concentrations of PM_{10} on September 27, 2014 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty westerly winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty westerly winds. Days before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown dust emissions to the exceedance on September 27, 2014.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} concentrations measured at the Brawley monitor were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains issued notices by the NWS and Imperial County pertinent to the September 27, 2014 event. The weather notices support the regional extent of the weather system. In addition, this Appendix contains the air quality alert issued by Imperial County advising sensitive receptors of potentially unhealthy conditions in Imperial County resulting from the strong gusty

winds.

Appendix B: Meteorological Data

This Appendix contains the time series plots, graphs, wind roses, and QCLCD data for selected monitors in Imperial and Riverside counties. These graphs demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds

This Appendix contains the graphs depicting the correlations between PM_{10} concentrations and elevated wind speeds for selected monitors in Imperial and Riverside counties. These graphs demonstrate the regional impact by the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule

This Appendix contains a description of the compilation of the BACM adopted by the ICAPCD and approved by the USEPA. Seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.